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AIR POLLUTION ABSTRACTS

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Vol. 3, No. 5 May 1972

Prepared by:
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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INTRODUCTION

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching–more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS–HUMAN HEALTH

Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS–PLANTS AND LIVESTOCK

Effects on vegetation–crops, trees, other plants–and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS–MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

18536 APTIC NO. 37323

Ministry of International Trade and Industry (Japan), Aichi Prefectural Government (Japan), Nagoya Municipal Office (Japan), and Council for Industrial Pollution Control (Japan) REPORT ON INVESTIGATIONS FOR SOUTH NAGOYA AIR POLLUTION CONTROL MEASURES. *(Aichiken Nagoya nanbu chiku taiki osen boshi taisaku chosa hokokusho). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(11):646-654, Nov. 1971.*

A comprehensive investigation of air pollution was made in south Nagoya in view of serious problems in the past and of the future construction plans for new industries in the area. In the past, when the wind was southwesterly, Nagoya city often had more than 0.3 ppm pollution which lasted for as long as three hours. In addition to 56 existing factories, seven more will be completed by 1973 and five more are scheduled to go up after that. Projected sulfur dioxide concentration was obtained from using past records, wind tunnel dispersion experiments, theoretical calculations, meteorological factors, and from the multiplication of all these factors. Estimates for 1973 were as follows: emission sources, 601; stacks, 412; total oil consumption, 9,130,000 kl; total emission of SO2, 18,000 N cu m/hr; and average SO2 concentration, 600 ppm. The SO2 concentration was estimated as 24% lower than that at the time of investigation (1969), due to the estimated lower sulfur content in the fuel of 1.28%. The amount of SO2 emitted from stacks higher than 70 m was estimated as 85% of the total emission, and that from stacks higher than 120 m, 70%. An area of 37 km long and 5.5 km wide was predicted to have an average of 0.20 ppm SO2 concentration, and one area of Nagoya city was predicted to have the maximum of 0.39 ppm concentration. Upon these estimates, guidelines and suggestions were given to industries, especially to those with more than 0.02 ppm/hr concentration emissions. For those industries, the average sulfur content of fuels used in 1973 should be 1.0%. Stacks lower than 30 m are to be made higher than 30 m. According to improved plans, the total emission sources will be 655; stacks, 344; exhaust gas, 27,200,000 N cu m/hr; and SO2 emission, 14,600 N cu m/hr. These figures compared with 1970 statistics are a 56% increase in the total emissions, and an 11% increase in SO2 emission; but the average SO2 concentration will be reduced by 29%.

18537 APTIC NO. 37490

NEXT FEDERAL CLEANUP TARGET: AIRCRAFT NOISE AND EMISSIONS. *Environ. Sci. Technol., 6(3)220-222, March 1972.*

Noise levels above 85 decibels over an extended period of time pose a serious threat to human hearing and the rest of the body. Besides obvious hearing effects on the ears, the heart, blood vessels, hormone output by glands, acid secretion by the stomach, and the ability of the eyes to focus can be adversely affected by sudden exposure to noise. Retrofitting old generation aircraft to reduce noise, the revamping of present engines, and the use of different operational procedures are considered. Flight pattern adjustments and compatible land use are mentioned. Proposed state laws and present legislation in Congress pertaining to noise control are cited. Aircraft emissions are also considered. About a year ago, the Environmental Protection Agency began studying the impact of air operations on air quality for large metropolitan areas to indicate the feasibility of reducing such emissions either by handling aircraft in different ways or by mechanical alterations. Aircraft gives off only 3.3% of all pollution. But aircraft emissions can exceed air quality standards near airports. New emission standards are being proposed to reduce this problem. Retrofitting can be used to reduce smoke.

18538 APTIC NO. 37527

BUSES WHICH DO NOT POLLUTE THE ENVIRONMENT. *(Umweltfreundliche Omnibusse). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(3), 1p., Jan. 1972*

Diesel engine emissions are far below the present limits and are even below the limits which will go into effect in 1973. The carbon monoxide emission of the Mercedes-Benz diesel engine amounts to 5 g/BHPh; the hydrocarbon plus nitrogen oxide emission amounts to 8 g/BHPh. The diesel engine can still be further developed to an even higher reduction of pollutant emissions. Apart from the diesel engine, further development of natural gas and electric drives is promoted. Experiments with the Mercedes-Benz natural gas engine yielded even lower pollutant emissions than found in diesel engines. With 2 g/BHPh for carbon monoxide and 3.8 g/BHPh for hydrocarbons and nitrogen oxides, the emissions are far below the limits which will go into effect in California in 1975. Trial runs of the natural gas engine showed, however, that the low pollutant emission is accompanied by a 15% higher fuel consumption. Buses with electric drive will be used in those areas where noise and all pollutant emission must be avoided. For an expansion of the distances which can be spanned by battery-driven buses, a diesel charging aggregate will be used in the outskirts.

18539 APTIC NO. 37665

SPI-STUDY ON REFUSE INCINERATION. *(SPI-Studie ueber die Muellverbrennung). Text in German. Verpackungs-Rundschau, no. 2:198, Feb. 1972.*

A study was conducted by the SPI on incineration of plastic waste. Two to four percent of plastic waste consisting of polyethylene, polystyrole, polyurethane, and polyvinylchloride was added to the normal refuse which is usually burned by the municipal incineration plant of New York City and which already contains between two and three percent plastic waste. Thus the prepared refuse--plastic mixture contained a plastic load which may be reached in 1980. The combustion of plastic waste did not cause additional smoke, since enough oxygen was added; no bad odors were noticed, even when burning polyvinylchloride. Free chloride and phosgene gas were not found. The concentration of chloride ions was 511 ppm when burning normal refuse; with the addition of 4% polyurethane foam, it increased to 751 ppm; with the addition of 4% polyvinylchoride it, increased to 1990 ppm. The medium nitrogen content of 103 ppm increased slightly when adding plastic waste, while the content of organic acids remained unchanged.

18540 APTIC NO. 37721

Ministry of Health and Welfare (Japan) Dept. of Environmental Pollution Control

ABOUT THE NATURE AND EFFECT OF HARMFUL SUBSTANCES (POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW. *Article 2, Item 1, No. 3. (Yugai busshitsu (Ho dai 2 no, Dai 1 ko, Dai 3 go) no seijo oyobi eikyo ni tsuite). Text in Japanese. 44p., May 1971.*

The nature, permissible concentration, and measurement methods of cadmium, chlorine, fluorine, lead, nitrogen, and their compounds. Cadmium and its compounds include metallic cadmium, cadmium oxides, and cadmium salts. Oral and inhaled toxicities are mentioned. The dithizone method is used to measure cadmium. The rhodanic mercury method is used to measure hydrogen chloride and the detecting tube method and the orthotolizine method is used to measure chlorine. Acute and chronic effects of chlorine compounds are discussed. Fluorine, hydrogen fluoride, difluoric oxides, and fluorides are measured by the alizarin complexon method. Lead, inorganic lead compounds, metallic lead, lead oxide, lead chloride, and organic lead each have unique toxic properties. The dithizone method is used to measure lead. Nitric oxide, nitric anhydride, nitrous oxide and nitrogen dioxide are discussed. The detecting tube and naphthylethylene-diamine methods are explained.

18541 APTIC NO. 37732

HEATING PLANT SUPPLIES 11,000 APARTMENTS. *(Heizkraftwerk versorgt 11000 Wohnungen). Text in German. Heizung-Lueftung-Haustech., 22(12):393-394, Dec. 1971.*

The city of Recklinghausen in 1963 decided to construct a remote heating plant. More than 1000 individual units will be supplied by remote heat. If those buildings were heated by oil or coke, the emissions by Diesel trucks which deliver the fuel alone would be 250,000 to 300,000 cu m per year, not to speak of the stack emissions by the individual heaters. Presently 11,000 apartments are supplied with heat by the plant. In 1970, 155 billion kcal/hr of remote heat were produced which is enough for heating 700,000 sq m of living space. Had the same space been heated by coal, 30,000 t would have been required, the flue gases leaving the chimneys without filtration. In the remote heating plant, the flue gases are cleaned in electrostatic precipitators and leave through a 145 m high stack. The filters attain a collection efficiency of 99.6%. The fly ash collected in the filters is pneumatically transported to a collection bunker and sold.

18542 APTIC NO. 37649

Aiba, Junichi

CONSTUCTION OF BYPASS AND ENVIRONMENTAL DESTRUCTION. *(Baipasu kensetsu to kankyo hakai). Text in Japanese. Jurisuto (Jurist), no. 492:99-105, Nov, 10, 1971.*

Construction of automobile highways and increase of automobiles are constantly increasing. In 1969, the number of automobiles in Japan reached 16,500,000 and construction of bypasses has become an important highway policy in order to solve road congestion. Umplanned bypasses, in connection with defective municipal and regional planning, have caused the spread of environmental destruction. The highway policy in relation to bypass construction must be reconsidered from an environmental viewpoint. Four tables and three charts concerning the number of automobiles, amount of traffic, and alignments decided in 1970 are given.

18543 APTIC NO. 37122

AIR POLLUTION IN FLORIDA. *A.M.A. Arch. Ind. Health, 12(5):567, Nov. 1955.*

At least six phosphate companies in central Florida are manufacturing sulfuric acid by the contact process for treatment of phosphate rock. Five of the sulfuric acid plants are in a six-mile-long area. For a distance of about half a mile from each plant there has been marked destruction of pine trees and some slighter damage to other vegetation. In addition, there have been many complaints of throat and mucous membrane irritation due to fumes from the plants. Field studies to determine the amount of sulfur dioxide emitted from plant stacks are in progress.

18544 APTIC NO. 37756

Auger-Barreau, R.

MICROBIOLOGICAL CONSTITUENTS OF THE ATMOSPHERE: FUNGAL AIR POLLUTION IN BORDEAUX. *(Constituants microbiologiques de l atmosphere pollution fongique de l atmosphere bordelaise). Text in French. Pollut. Atmos. (Paris), 13(52):293-300, Oct.-Dec. 1971. 54 refs.*

A general description is given of biologic air pollution and sampling methods, and the results of an investigation of fungal air pollution in Bordeaux are reviewed. Most of the fungi are present in the air throughout the year, their proliferation is dependent of the humidity and the temperature. Methods and techniques applied to the isolation and identification of toxic spores suspended in the air are described (non-selective and selective culture-media, natural sedimentation, Petri shells). In the Andersen apparatus, volumetric and Petri-shell sedimentation methods are combined. Here, the exposure time required is 10 min against 10-60 min in other techniques. The Petri shells are maintained at temperatures of 37 or 50 C. The colonies thus obtained are examined on the 3rd, 8th, and 20th days. In intramural investigations the most frequent genera were Penicillium, Cladosporium, Rhodotorula, Aureobasidium, Alternaria, Botrytis, Aspergillus, Epicoccum, Rhizopus, Mucor, Mycelia sterilia, Geotrichum candidum, Fusarium, Trichothecium, Sporotrillum, Trichoderma, Cephalosporium, and Monilia. Molds were detected in house dust. Extramural investigations carried out in Bordeaux by means of Andersen s apparatus and Petri shells revealed Penicillium, Aspergillus, Mucor, and Botrytis. The effects of humidity, temperature, wind direction, turbulence, and precipitation on the spores count were studied. The effects of other air pollutants on the allergenic properties of biologic particles, and the interactions between biologic and organic and inorganic pollutants should be investigated.

18545 APTIC NO. 37015

Bach, W.

AUTOMOBILE EXHAUST HAZARDS. *(Ein Beitrag zur Schaedlichkeit der Autoabgase). Text in German. Vitalst. Zivilisationskr., vol. 13:120-123, June 1968. 27 refs.*

The extent of the air pollution problem caused by automotive exhausts, and potential hazards to human health are examined. As of January 1966, world vehicle registration was 177 million, of which about 90 million were registered in the United States and about 10 million in West Germany. Estimates indicate that a car consuming 45 liters of gasoline emits about 19 liters of carbon monoxide, four liters of hydrocarbons, and one liter of nitrogen oxides. Other major constituents of automotive exhausts include ozone, aldehydes, sulfur dioxide, and lead. Symptoms resulting from exposure to exhaust components are discussed, and measured concentrations are compared with official threshold values.

18546 APTIC NO. 37648

Balke, Siegfried

CHEMISTRY AND ENVIRONMENT. *Chemie und Umwelt. Text in German. Tech. Ueberwach. Zicherheit Zuverlaessigkeit, 12(2):33-36, Feb. 1971.*

Air pollution is caused by industry, households, traffic, soil erosion, and metabolic processes. The internal combustion engines driven by fuels containing lead pollute the air because of the exhaust gas. In the Federal Republic of Germany, the annual consumption of fuel containing tetraethyl lead amounts to 15 million tons containing about 0.5 g pure lead per liter fuel. In 1968 in the USA, about 225,000 tons of antiknock compounds were consumed. The general situation concerning radioactive material did not become worse because of the severe legislation in the Federal Republic of Germany and the prescriptions of EURATOM. Special attention is paid to still active gaseous by products deriving from nuclear fission.

18547 APTIC NO. 37672

Baum, Fritz

CO EMISSION BY DOMESTIC HEATERS. *(Co-Emissionen aus Hausbrand-Feuerstaetten). Text in German. Staub, Reinhaltung Luft, 32(2):54-59, Feb. 1972. 15 refs.*

Domestic heaters for solid fuel emit carbon monoxide in accordance with the combustion process. Carbon monoxide is developed primarily at low temperature in the fuel bed, i.e., at the onset of the combustion process or at low-temperature combustion with a low fuel load. In contrast to solid fuel-fired domestic heaters, the CO emission by liquid-fuel or gas-fired domestic heaters is negligible. A good maintenance service is prerequisite though. Based on the specific CO emission for solid fuel domestic heaters of 0.5 volume percent over the combustion period, the prospective CO emission in the Federal Republic of Germany and in North Rhine Westphalia by 1980 can be determined with the aid of the expected solid fuel consumption. It is expected that the CO emissionn declines in the entire FRG from 2.5 million tons/annum in 1968 to 1 million tons/annum by 1980. In North Rhine Westphalia, it will decline from more than 1 million tons/annum to 0.6 million tons/annum. In the winter of 1970, the CO emission by passenger cars was less than 4 million tons; the CO emission by solid-fuel-fired domestic heaters, 2.5 million tons which is more than 62% of the respective emissions by passenger cars.

18548 APTIC NO. 36989

Bocquillon, C. and J. L. Grude

STUDY OF THE POLLUTION IN A ROAD TUNNEL BY MEANS OF A HYDRODYNAMIC MODEL. *(Etude sur modele hydrodynamique de la pollution d un tunnel routier). Text in French. Ecole Superieure d Ingenieurs Beyrouth (Lebanon), Tech. Publ., no. 23:21-61, 1970.*

An unusual design for a two-way, six-lane road tunnel 5.1 km long and 24 m wide under Mazraa Boulevard in Beirut, Lebanon eliminates the need for forced ventilation by providing a longitudinal slot 4 m wide in the top slab of the tunnel, directly open to the outside atmosphere. The slot will be covered locally where necessary to permit cross-overs at road intersections. A laboratory model has been built to provide a means for estimating anticipated carbon monoxide pollution inside the tunnel from car exhausts. The inside dimensions of the model are 1/100th of the real size, i.e, 24 cm wide with an effective length of 1 m, corresponding to a 100-m long portion of the real tunnel. Water instead of air was chosen as the inside and outside environmental medium. Scaled models of cars are cable-mounted to move through the tunnel. Atmospheric winds are simulated by varying water movement in the water tank with a series of inlet and outlet valves; the pollutant is simulated by violet aniline dye. The dye is injected at a rate of 2 l/hr, corresponding to a CO discharge of 27 liters per car, theoretically causing a pollution at the maximum permissible concentration of 200 ppm. The concentration of dye in the water is then measured at specified time intervals either by photographic analysis or by colorimetric tests of water samples. Mathematical evaluation of the similitude is based on equality of the Stanton numbers for the real and model conditions.

18549 APTIC NO. 37256

Brockhaus, A. and K. H. Friedrichs

SOURCES OF EMISSIONS. *(Quellen der Emissionen). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, 155(3):256-262, 1971. 4 refs. (Presented at the Anlass der Bad Godesberger Hygienetagung 1971.)*

Both natural processes and human activities pollute air with gases and particulate matter. Examples of natural processes are normal erosion and dust storms in desert countries. Any form of combustion is typical of human activities that cause pollution. Because of the incompleteness of combustion processes, this kind of energy conversion is accompanied by the discharge of material by-products in the air. The ratio of carbon dioxide-to-carbon monoxide as an indicator of the completeness of combustion is extremely variable, e.g., 10,000:1 for power plants; 20:1 for domestic fuel burning; and 3:1 for motor vehicles. Moreover, the smoke produced by combustion consists mainly of particulate and liquid matter. Of the three approaches to reducing air pollution, the first seeks to avoid any emissions through control of fuel quality. The second stresses improved dust collection techniques, i.e., filtration, to reduce liquid and particulate concentrations. The third emphasizes dispersion of smokes from tall stacks.

18550 APTIC NO. 37537

Brodine, Virginia

RUNNING IN PLACE. *Environment, 14(1):2-11, 52, Jan./Feb. 1972. 30 refs.*

Current efforts to reduce pollution from fossil-fuel burning and automobiles are reviewed and various estimates of future air pollution are given. The present reliance on ambient standards and the air quality management concept, which is addressed soley to local situations and does not require an air quality region to use the best available technology, will not reduce the total burden of pollutants from stationary sources -- industry, power generation, agriculture, space heating, and waste disposal. Gains in controlling emissions from each single source will be offset by the increase in the number and the size of sources. Even with controls, sulfur dioxide emissions from the power industry will increase two or three times by 2000, when nitrogen oxide emissions will be about 24 million tons. The air quality management concept is also totally unsuitable for dealing with automobile pollution. Pollution from this source will begin to rise again by about 1990 when control devices will have their maximum effect. Pollution must be viewed in terms of larger geographical units and its relationship to power use, transportation policy, city planning, and other environmental problems.

18551 APTIC NO. 37311

Burnett, William E.

GASES AND ODORS FROM POULTRY MANURE: A SELECTED BIBLIOGRAPHY. *Poultry Sci., vol. 50:61-63, Jan. 1971. 35 refs.*

Vast technological changes which have taken place in poultry management in recent years have created acute problems in waste disposal and the control of gases and odors from poultry manure. A bibliography is presented of some of the more pertinent articles related to odors and gases from poultry manure. The titles have been grouped under the following headings: The Microbiology and Chemistry of Gas and Odor Production; Identification and Determination of Gases and Odors; and Odor Control Methods.

18552 APTIC NO. 37589

Candeli, A., V. Mastrandrea, and G. Morozzi

POLYCYCLIC AROMATIC HYDROCARBONS IN THE EXHAUST GASES OF INTERNAL COMBUSTION ENGINE, WORKING WITH DIVERSE COMMERCIAL FUELS. *(Idrocarburi aromatici policiclici nei gas di scar-*

ico di un motore a combustione interna alimentato con diverse benzine del commercio). Text in Italian. Riv. Ital. Igiene (Pisa), vol. 29:191-204, May/Aug. 1970. 17 refs.

Polycyclic aromatic hydrocarbons were analyzed in the exhaust gases of a simulated combustion engine operated with three different commercial fuels. With the exception of one compound, the aromatics were qualitatively the same (18 for fuel 3 and 17 for fuels 1 and 2). Quantitative differences were observed, however, fuel 2 produced higher concentrations of almost all the hydrocarbons than fuels 1 and 3. The 3,4-benzopyrene found per liter of gasoline equaled 47.84 and 53 micrograms, respectively, for exhaust gases from fuels 1, 2, and 3. The ratios calculated for some of the polycyclic hydrocarbons were in agreement with published data: P/3,4-Benzopyrene higher that 1 (19.37; 23.15; and 14.61, respectively, for the samples C/1, C/1, and C/3); BaP/Perylene lower than 0.6 (0.28 for all three samples); BaP/ Coronene lower than 1 (0.41; 0.97; and 0.39, respectively, for the samples C/1, C/2, and C/3).

18553 APTIC NO. 36958

Cooper, Charles F.

EFFECTS OF PRESCRIBED BURNING ON THE ECOSYSTEM. *Forest Service, Macon, Ga. Southeastern Forest Experiment Station; Duke Univ., Durham, N. C., Clemson Univ., S. C.; Clemson Univ., S. C., Belle W. Baruch Research Inst. in Forestry, Wildlife Science, and Marine Biology, Prescribed Burning Symp. Proc., Charleston, S. C., 1971, p. 152-160. 16 refs. (April 14-16.)*

In the Southeast, properly managed prescribed burning is unlikely to have any adverse effect on quality and quantity of ground or surface water, climate, precipitation processes, or dead and live biomass. However, current reliance on large even-aged pure stands all temporarily weakened at the same time by an extensive prescribed burn could result in decreased production. For a permanently productive forest system, emphasis should be on small blocks, differing in age and composition, and each handled according to a different management prescription and operational schedule. Furthermore, increased diversity may lessen local opposition to prescribed burning.

18554 APTIC NO. 36956

DeMarco, Jack, Daniel J. Keller, Jerold Leckman, and James L. Newton

INCINERATOR GUIDELINES - 1969. *Public Health Service, Rockville, Md., Bureau of Solid Waste Management, PHS-2012, 98p., 1969. 52 refs.*

The advantages of incineration are numerous, especially where land within economic haul distance is unavailable for disposal of solid waste by the sanitary landfill method. An incinerator requires a large capital investment, and operating costs are higher than for sanitary landfill. Skilled labor is required to operate, maintain, and repair the facility. However, the potential of incineration as a space conserving mechanism can be demonstrated by comparing the volume requirements for final land disposal of an incinerator residue with the volume requirements for a sanitary landfill system receiving unburned solid wastes. A few incinerators include grinding or shredding equipment for reducing very bulky items to sizes suitable for charging. Incinerator design must meet regulations intended to preserve the quality of the environment and the health and safety of the operators. Other design data include determination of present and future population to be served and quantity, composition, and characteristics of the waste. Site selection, plant layout, building design, electrical power, water requirements, sewers, communications, and fuels are considered. The weighing of incoming solid waste and outgoing residue is discussed. The receiving and handling of solid waste, furnaces and appurtenances, recovery and utilization of heat, and instruments and controls are described. Incinerator effluents and their control are indicated. Solid wastes that require special consideration are noted, as well as salvage, operation, and maintenance. The text of a 1966 Executive Order detailing performance standards and measurement techniques for controlling air pollution from Federal installations is included.

18555 APTIC NO. 36992

Dieterich, John H.

AIR-QUALITY ASPECTS OF PRESCRIBED BURNING. *Forest Service, Macon, Ga. Southeastern Forest Experiment Station; Duke Univ., Durham, N. C.; Clemson Univ., S. C.; Belle W. Baruch Research Inst. in Forestry, Wildlife Science, and Marine Biology, Prescribed Burning Symp. Proc., Charleston, S. C., 1971, p. 139-151. 21 refs. (April 14-16.)*

Results of a nationwide emission inventory indicate that of the 214.2 million tons of air pollutants produced in 1968, forest fires, including both wildfires and prescribed burning, accounted for 17.3 million tons. The fires contributed nearly 24% of the total particulates from all sources, seven percent of the total carbon monoxide, slightly less than seven percent of the total hydrocarbons, and 5.8% of the total nitrogen oxides -- the later probably from wildfires. Another source puts the production of particulates by prescribed burning alone at 6.5 million tons/yr. The advantages of using prescribed burning for land management and protection carries with it an obligation to conduct burning operations in way that will eliminate or minimize adverse effects on air quality. Effective management of smoke from burning is largely dependent on the ability to forecast weather for specific areas and to utilize the forecasts to direct smoke away from major highways, airports, and metropolitan areas. Failure to observe these precautionary measures will result in more restrictive burning regulations. In any case, improvement of methods and techniques use for prescribed burning is imperative.

18556 APTIC NO. 37664

Dyke, Lester F. Van

U. S. POWER FIRMS BEGIN BURNING CRUDE. *Oil Gas J., 70(6):28-30, Feb. 7, 1972.*

Electric utilities are beginning to fire crude oil under their boilers for the first time as one step in their scramble for low-sulfur fuel supplies to meet tough new air quality standards. By 1975, crude consumption will climb close to 175,000 b/d on the basis of currently announced projects. Until recently, residual fuels, coal, and nautral gas were much cheaper than a barrel of crude oil and in ample supply. Being more volatile than residual or distillate, crude oil requires special storage tanks, piping, ventilation, and burner modifications. However, in 1970, supplies of low-sulfur residual fuels to meet air quality standards became scarce, and prices of residual oil rose dramatically. The utility companies which are burning or will burn crude are listed.

18557 APTIC NO. 37419

Fokina, V. D.

AIR POLLUTION IN THE USA. *(Zagryazneniye vozdushnoy sredy v SSHA). Text in Russian. Gigiena i Sanit., 36(11):85-87, Nov. 1971. 14 refs.*

Air pollution problems in the U.S.A. are reviewed. The total volume of automotive exhaust amounts to 94.6 million tons yearly, and 8-15% of the fuel pollutes the air due to evaporation. In this regard, Los Angeles and New York are hardest hit. In the latter, 4140 tons of carbon monoxide, 560 tons of hydrocarbons, and 106 tons of nitrogen oxides are emitted by automobiles daily. In cities of over 50,000 people, the contribution by exhaust to total air pollution lies at 60%, while the respective shares of industries and thermal power plants are 17% and 14%. Sources of heat and waste incineration account for 6% and 3%, respectively. Air traffic is also an important factor in air pollution. At the Washington, D. C. airport, 35 tons of pollutants are emitted daily. Chemical, metallurgic, and cellulose manufacturing plants and refineries are the chief sources of pollution in the industrial sector. The damages caused to agriculture were evaluated at 500 million dollars in 1969. Despite massive federal and local research programs, developments, legislation, and standards, the situation is worsening. Damages reached 12 billion dollars in 1969. The maximum allowable sulfur dioxide concentration in air is 0.15 ppm. Within a global program, the 1965 pollution level should be maintained in 2000.

18558 APTIC NO. 37605

Fortnagel, Manfred

INFLUENCING THE EXHAUST GAS COMPOSITION BY EXHAUST GAS RETURN IN A CHARGED FLUID-CHAMBER DIESEL ENGINE. *(Beeinflussung der Abgaszusammensetzung durch Abgasrueckfuehrung bei einem aufgeladenen Wirbelkammer-Dieselmotor). Text in German. Motortech. Z. (Stuttgart), 33(2):35-40, Feb. 1972. 2 refs. (Presented at the Fach- und Rechtsfragen des Umweltschutzes Symposium, Trier-Kaiserslautern University, West Germany, Sept.22, 1971.)*

The diesel engine with increased power through exhaust gas turbo-charging is a suitable alternative for the Otto engine in passenger cars. It has low carbon monoxide emissions as all Diesel engines, lower hydrocarbon formation through intense mixing of the fuel with the air, and low nitrogen oxides emissions (27% lower) with only slightly higher fuel consumption. Chamber engines with exhaust gas turbo-charging permitting a later injection begin over the entire operating range so that the highest pressure in the main combustion chamber never rises beyond the compression-end-pressure. The exhaust gas return reduces the specific emission values as tested by the 13-step California test from 3.62 without exhaust gas return to 2.26 g/HPh with exhaust gas return for NO2 and from 0.81 to 0.79 g/HPh for hydrocarbons. The CO emission increases from 3.16 g/HPh without exhaust gas return to 3.57 g/HPh with exhaust gas return, but it remains below the limit value of 25 g/HPh which will go into effect in 1975.

18559 APTIC NO. 37646

Garvey, James R.

THE PROBLEM OF SULFUR IN FUELS. *American Society of Mechanical Engineers, New York, N. Amer. Fuel Technol. Conf. Proc., Ottawa, Canada, 1970, p. 21.1-21.13. 16 refs. (May 31-June 3.)*

According to surveys conducted by the National Center for Air Pollution Control, the combustion of coal and petroleum products accounts for 78% of the 22 million tons of sulfur dioxide emitted in the U. S. each year. The use of coal and oil for electric power generation accounts for most of the emissions, which may reach 56 million tons annually in the next 25 years unless better control practices are followed. High-sulfur coal is the only indigenous fuel available in sufficient quantity to meet the growing demand for electric power (estimated at half a billion kilowatt-hours by 1980). Since most high-sulfur coal is not readily desulfurized prior to combustion, the final alternative method for control of sulfur oxides is the development of flue-gas cleaning systems for converting the oxides into recoverable form. The advantages and disadvantages of the processes now under study are reviewed.

18560 APTIC NO. 37131

Gilbert, J. A. S. and A. J. Lindsey

POLYCYCLIC HYDROCARBONS IN CIGARETTE SMOKE: THE AMOUNTS HELD IN STUBS AND ASH. *Brit. J. Cancer (London), vol. 10:642-645, 1956. 12 refs.*

Polycyclic hydrocarbons in stubs and ash from 500 cigarettes were chromatographically determined following extraction with cyclohexane. Compounds detected were acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, pyrene, fluoranthene, 1,2-benzanthracene, perylene, 3,4-benzpyrene, anthanthrene, and coronene. The amounts of each are given. Cigarette tobacco smoked in a pipe gave rise to the same hydrocarbons, although in much greater amounts.

18561 APTIC NO. 37300

Grimbergen, M. van, G. Reybrouck, and H. van de Voorde

THE DEVELOPMENT OF IMPURITIES IN THE AIR FROM BURNING THERMOPLASTICS. *(Das Entstehen von Luftverunreinigungen bei Verbrennung thermoplastischer Kunststoffe). Text in German. Zentr. Bakteriol., Parasitenk, Infektionskr. Hyg.: Abt. I: Orig., Reihe B, 155(2):123-130, 1971. 20 refs.*

Plastics that are often used as disposable packaging materials were burned in an electric oven to determine the gaseous and solid impurities in the emission. Pure polyethylene (PE) and polystyrene ne (PS) were completely burned at 300-400 C with excess air. Pure polypropylene (PP) and PP injection syringes gradually disintegrated at 200-400 C. During the burning of PE and PP, large amounts of soot and tar products were formed. Pure polyvinyl chloride (PVC) burned without an ash residue at about 650 C, but the PVC tests always gave an ash residue of about 4.5% at this temperature. The gases generated by the burning of PE, PP, PS, and PVC produced a strongly acid pH pattern in water. With the exception of considerable concentrations of aliphatic aldehyde, the waste gases from PE and PP are not source of air air pollution. When polystyrene is burned, a large amount of styrene is formed. The thermal destruction of PVC is always associated with formation of hydrogen chlorine, regardless of temperature.

18562 APTIC NO. 37153

Grunder, L. J., P. C. Rich, and H. E. Jordan

GASSING - OR ENGINE HALITOSIS. *Proc. Am. Transit Assoc. Affil. Org., vol. 58:98-123, 1939. (Presented at the American Transit Association Annual Convention, 58th, Los Angeles and San Francisco, Calif., Aug. 9-16, 1939.)*

Concentrations of carbon dioxide, oxygen, and carbon monoxide in exhaust samples from buses were measured by Orsat analysis. Odor characteristics of the exhaust gas were studied in terms of aldehyde concentrations as measured by a colorimetric technique. To determine chemical changes taking place in partially oxidized gas between exhaust manifold and tailpipe, successive samples were taken in collector tubes. The Orsat analysis showed a high percentage of free oxygen passing out of the engine, indicating incomplete combustion. During the first seven seconds at the tail pipe, after the throttle was closed and while the normal products of combustion were being ejected, there was very little free oxygen present and little CO, but considerable CO2. The next seven-second period, during gassing, showed over 10.5% oxygen, 2% CO2, and 3.5% CO. After this, the free oxygen increased to about 16%. The loss of free oxygen through the exhaust system suggests that oxygen combines with hydrocarbons to form complex partial oxidation products, some with bad odors. Aldehyde concentrations were influenced by compression ratios. Engine design, maintenance, fuel factors that will eliminate gassing, and mechanical degassers are discussed. Manifold design is particularly important.

18563 APTIC NO. 37114

Henein, N. A.

COMBUSTION AND EMISSION FORMATION IN FUEL SPRAYS INJECTED IN SWIRLING AIR. *Preprint, Society of Automotive Engineers, Inc., New York, 11p., 1971. 37 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710220.)*

Mathematical models were derived for the mechanisms of combustion and emission formation in fuel sprays injected in swirling air, emphasising the finely dispersed sprays used in open-chamber diesel engines. Emissions studied were unburned hydrocarbons, carbon monoxide, aldehydes, smoke particulates, and nitrogen oxides. All of these except the nitrogen oxides may be formed in different regions of the spray and eliminated later during the combustion process. The net emission is the result of the formation and elimination reactions. Under light loads the unburned hydrocarbons are mainly related to the lean flameout region (LFOR) at the leading edge of the spray. Under heavy loads, they are related to the core, fuel deposited on the walls, spray tail, and after-injection. At light loads, carbon monoxide is related to the region around the boundaries between the LFOR and the lean flame region (LFR). Under heavy loads, CO is related to the core, fuel deposited on the walls, spray tail, and after-injection. Aldehydes are mainly related to the LFOR. Smoke particulates are rexted to the spray core under heavy loads and the spray tail; they are greatly increased by after-injection. The concentration of nitrogen oxides during the combustion of the LFR is low because of the relatively low temperatures involved. However, nitrogen oxides in this region and in other parts of the combustion chamber increase due to the combustion of the rest of the spray. (Author conclusions modified)

18564 APTIC NO. 37322

Hosono, Y., G. Kawaski, M. Yamazaki, S. Inada, M. Ishisaka, S. Maeda, S. Taka, R. Ishisaki, K. Senda, I. Yamazaki, and I. Shinmura

ON THE HYDROGEN CYANIDE IN EXHAUST GAS OF ELECTRIC FURNACES. *(Denkiro haigasu-chu no shianka suiso ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):246, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The hydrogen cyanide concentration in exhaust gas from yellow phosphorus, carbide, and zinc electric furnaces used in 13 factories (a total of 34 furnaces) was 70-200 ppm in exhaust gas and 15 ppm in waste water used for liquid scrubbing. The HCN concentration an electric yellow phosphorus furnace was as high as 2000-5000 ppm, while that in a zinc furnace was only several ppm, due to its relatively low furnace temperature. The HCN in the waste water was readily removed with sodium hypochlorite and formalin, and the exhaust gas was recycled as fuel in the furnace. As the result, the HCN concentration in exhaust gas was nothing or a trace amount in most cases.

18565 APTIC NO. 37681

Iliff, Neil

ORGANIC CHEMICALS IN THE ENVIRONMENT. *New Scientist, 3(781):263-265, Feb. 3, 1972.*

World-wide, up to 20 million tons of manufactured organic chemicals enter the environment annually. The majority of organic chemicals (about 75%) are processed either in their place of manufacture or elsewhere. Over two-thirds of the latter are used to synthesize end-products, e.g., plastics and resins, synthetic fibers, rubber, and surface coatings. Of the remaining 25%, consisting of chemicals used as such, the greater part is further processed within the industry itself to produce such products as solvents, glycols, and detergents. Of the gaseous basic chemicals used as manufacturing building blocks, up to 1 million tons yearly enter the environment. Problems of liquid effluent disposal from chemical works are also serious. The contribution of lubricants and industrial oils to air and water pollution may add up to more than 2 million tons annually. Two case studies of major man-made organic chemicals, ethylene and chlorofluorocarbons, are considered. The chemicals that need to be studied are those that do not occur in nature, and for which degration pathways may not exist. Further and more objective research is imperative.

18566 APTIC NO. 37246

Keylwert, Johann

PARALLEL- AND INTERNAL-AXIS ROTARY PISTON INTERNAL COMBUSTION ENGINES WITH CAM GEARING. *(Parallel- und innenachsige Rotationskolben-Brennkraftmaschine mit Kaemmeingriff). Text in German. (Kloeckner-Humboldt-Deutz A. G., Cologne, West Germany) W. Ger. Pat. 1,576,202. 4p., Oct. 21, 1971. (Appl. May 6, 1970, 4 claims).*

The piston has a number of arc-shaped peripheral lobes, of which every other one has an inlet control opening for an inlet passage. The combustion chamber is mounted centrally and axially symmetrical, and the inlet control opening is so offset in relation to the radial axis so that it intersects the combustion chamber area as it moves. Thus, it improves the air movement and air utilization and reduces pollution.

18567 APTIC NO. 37644

Kruse, Carl-Ludwig

CHEMICAL COMPOSITION OF AUTOMOBILE EXHAUST CONDENSATES. *(Untersuchung der chemischen Zusammensetzung von Abgas-Kondensaten aus Otto-Motoren). Text in German. Luftverunreinigung, 1970:7-8, Dec. 1970.*

A study was made of the relationship between the pH, chlorine, and acid content of automobile exhaust gas condensates and corrosiveness. Test results are presented for the same engine operated with premium and regular gasolines and for different motors operated with regular gasoline. The composition of exhaust gases varied from engine to engine, and premium gasoline appeared to give less corrosive products than regular gasoline. The operating state of an engine, as well as its type, also had a pronounced influence on the composition of exhaust condensates. Premium gasolines gave condensates with 39-600 mg Cl/l, while normal gasolines gave condensates with 130-270 mg Cl/l.

18568 APTIC NO. 37029

Laamanen, Arvo

VIEWS ON CLEAN AIR PROTECTION PERTAINING TO CONSTRUCTION MATERIAL PRODUCTION, CONSTRUCTION, AND BUILDINGS. *(Rakennusainetuotantoon ja - toimintaan seka rakennuksiin liittyvia ilmansuojelunakokohtia). Text in Finnish. Rakennustekniikka, vol. 5:250-256, 1969.*

There are various types of pollution sources in the field of construction. Cement factories emit solid inorganic particles and an assortment of chemicals. The production of lime, asphalt, and gravel leaves quantities of solid pollutants in the air as the result of drilling, crushing, sifting, and grinding of rock. In some instances there is also odor pollution, as in lime burning and asphalt production. In checking the possibilities of pollution from construction, one has to take into account various factors, such as demolition of existing buildings, drilling, and heating. As construction affects air pollution, it, in turn, affects construction materials. Smoke leaves a film on some surfaces; heavier particles in the air blown around by winds act much like sandblasters; lead-base outdoor paints change color when there is hydrogen sulfide in the air. Studies have been made on the effects of pollution from superhighways on the surrounding areas. These studies will aid in planning future construction in such areas in a way that will insure the least amount of deterioration to construction materials. In order to limit pollution from construction sources, the builder has to learn to recognize the sources of pollution, the amounts and types emitted, and the proper prevention.

18569 APTIC NO. 37070

Leake, John W.

LOUISVILLE INCINERATOR OPERATES ON PRODUCTION LINE BASIS. *Am. City, 1957:104-107, Nov. 1957.*

Metal salvage, fly ash control by spray collectors, wood hogs handling, equipment standardization, income and savings, and refuse collection trucks are discussed for the municipal refuse incinerator in Louisville, Ky. A registering scale records the weight of all incoming refuse. Two 5-ton overhead cranes transfer the refuse from the receiving bin to the charging hoppers. Both cranes have air-conditioned cabs to help keep the operators alert throughout the 8-hour shift. The hoppers are of the constant-feed type, without charging doors used in batch feeding, discharging refuse directly onto a pair of oscillating drying grates. Hot gases passing over the material remove about 50% of the moisture before it drops onto a second set of oscillating grates known as the ignition grates. About 30% combustion takes place as the refuse passes over the ignition grates. It then drops into the kiln where burning continues. Quenching operations consist of dumping the kiln residue into a water bath trough running across the backs of the furnaces. Drag-type conveyors remove the residue from the quenching trough and deposit it into a revolving screen. An annual income of about $200,000 is anticipated from sale of salvaged metal, and about $50,000 per year is saved by drying sludge at the plant.

18570 APTIC NO. 37752

Locher, F. W., S. Sprung, and D. Opitz

REACTIONS ASSOCIATED WITH THE KILN GASES. CYCLIC PROCESSES OF VOLATILE SUBSTANCES, COATINGS, REMOVAL OF RINGS. *(Zement-Kalk-Gips (Wiesbaden), 25(1):1-12, Jan. 1972. 46 refs. (Presented at the Verein Deutscher Zementwerke Congress, Duesseldorf, West Germany, Sept. 28-Oct. 1, 1971.)*

In addition to dust from the process material the gas stream in a cement kiln contains mainly alkali sulfates, alkali chlorides, and calcium fluoride formed by reaction in the kiln gas after vaporization from the material. If these compounds react with or are precipitated on the material in the colder parts of the kiln, they will form an internal cycle. If they are precipitated in the gas cleaning installation and are then returned to the process, they will form a closed external cycle which will be broken if the substances in question are discarded with the dust collected in the precipitator. Material balance investigations on 11 kilns with suspension preheaters and 10 kilns with grate-type preheaters determined that the internal alkali and sulfur cycles are approximately equal. Approximately equal amounts of alkali and sulfate are also precipitated with the dust; dust quantities for the suspension preheater are 50-117 g/kg of clinker as compared with up to 20 g/kg for the grate-type preheater. The reaction with the alkalies is of decisive important with regard to sulfur dioxide emissions. The internal chloride cycle increases steadily if the chloride content of the raw meal exceeds 0.01-0.015% by weight. The fluoride is combined mainly in the clinker. Objectional coatings and meal, sinter, and clinker rings can be obviated by appropriate reduction of the cycles in question (coatings and meal rings) or by reduction of the proportion of fusible matter in the clinker (sinter and clinker rings). A further condition to minimize the formation of objectionable coatings is proper routine operation of the kiln. Effective methods for the removal of coatings and rings include cutting with high or low-pressure water jets, dislodging with a gun, or destroying by explosive action with the Cardox process.

18571 APTIC NO. 37353

Ludington, David C., Albert T. Sobel, and A. G. Hashimoto

ODORS AND GASES LIBERATED FROM DILUTED AND UNDILUTED CHICKEN MANURE. *Trans. ASAE (Am. Soc. Agr. Engrs.), 14(5):855-859, Sept.- Oct. 1971. 8 refs. (Presented at the American Society of Agricultural Engineers, Annual Meeting, Lafayette, Ind., June 1969, Paper 69-426.)*

Significant differences were observed between diluted and undiluted chicken manure with regard to the production and release of gases and odors. Carbon dioxide released from the undiluted manure was slightly greater than that released from diluted manure. The undiluted system released greater quantities of ammonia than the system diluted with water. Chicken manure stored in an undiluted state produced more hydrogen sulfide and ammonia than manure stored in an undiluted state. Odors arising from diluted or liquid manure have an odor strength comparable with the odors arising from undiluted manure. However, the quality of the odor from the liquid manure is very offensive compared with the ammonia odor from undiluted manure. When the manure was agitated at the end of the tests, the difference in quality was much more pronounced. (Author conclusions modified)

18572 APTIC NO. 37713

Masek, Vaclav

NEW FINDINGS CONCERNING THE PROPERTIES OF FLY DUST FROM COKING PLANTS. PART I: PHYSICAL-CHEMICAL PROPERTIES. *(Neue Erkenntnisse ueber die Eigenschaften des Flugstaubes aus der Kokerei. Teil I: Physikalisch-chemische Eigenschaften). Text in German. Zbl. Arbeitsmed., 22(2):38-47, Feb. 1972. 20 refs.*

With every ton of coke that is produced, 0.5 to 2.0 kg fly ash are obtained as a waste product. The properties of this fly dust were studied on three samples taken in summer 1970 from the NHKG coking plant in Ostrava-Kunice. The sorption properties were examined at temperatures between 22 to 20 C after boiling the dust sample is distilled water at a pressure of 100 to 150 mm Hg and withdrawing the water afterwards. The ion exchange capacity of the dusts was determined by conductometry according to Sandhoff. Furthermore the electrokinetic potentials, the magnitude of adsorption of several gases and vapors, the catalytic properties, and the crystalline quartz modification was determined. The sorption properties of the dust in most cases did not reach the capacity of ordinary filtering paper. They also have a relatively low exchange capacity in particular for sodium, potassium, and ammonia. The electrokinetic potentials of the particles are positive, however, and rather low. Like the sorption properties the adsorption capacity for gases and vapors is very low. At the dissociating hydrogen peroxide reaction, the contact catalytic properties of all dust samples were rather weak. The fly dust had very little activity.

18573 APTIC NO. 37383

Meier, Albert E.

STEAM-POWERED BUSES. *Motor Coach Age, 24(1):4-21, Jan. 1972.*

The thermodynamic principles of steam and early experiences with steam engines in vehicles are reviewed. Prior to World War I, at least 126 different firms are known to have been engaged in the manufacture of steam cars in the United States. Between 1923 and 1930, there were at least nine attempts to produce and market steam buses, and, in 1944, Seashore Transportation Co. in North Carolina placed a steam engine in a 1940 Beck Luxury Liner. The various companies which attempted to experiment with steam-powered buses and their experiences are described. European steamers are also mentioned. Gradually increasing public concern over air pollution led the Department of Commerce to appoint a panel to look into possible ways of cutting exhaust emissions from automobiles, and the advantages and disadvantages of steam power are summarized. In February 1969, the Department of Transportation awarded $450,000 to the California State Assembly for a test of steam-powered buses. Eleven bids from manufacturers were received and evaluated in May 1969; the scope of the project was revised when federal funding was increased to $1,121,000, and four vendors were to supply sample systems. The status of the experimental buses under development by Steam Power Systems, Inc. of San Diego, William M. Brobeck and Associates of Berkeley, Lear Motors Corp. of Reno, and Vought Aeronautics Co. of Dallas, is discussed. Design criteria and operating variables of each system are presented. The

Brobeck steamer was displayed in Washington on November 17, 1971, and it is presently operating for AC Transit in California.

18574 APTIC NO. 37663

Moore, John

THE EFFECTS OF ATMOSPHERIC MOISTURE ON NITRIC OXIDE PRODUCTION. *Combustion Flame, 17(2):265-267, Oct. 1971. 5 refs.*

Nitric oxide formation, the formation of nitric oxide in a hydrocarbon primary reaction zone, and the effect of water on stoichiometric hydrogen-air and ethylene-air flames are evaluated. The importance of the 2% and even 3% by weight of water which is present on hot humid days on nitric oxide formation lies in the fact that it reduces the flame temperature, upon which the formation is strongly dependent. The relative humidity of atmospheric air must be included in calculations of nitric oxide production in fuel-air flames.

18575 APTIC NO. 37730

Moureu, Henri

POLLUTION AND NUISANCE FROM CITY CROWDING. *(Pollutions et nuisances des agglomerations urbaines). Text in French. Pollut. Atmos. (Paris), 13(52):301-307, Oct.-Dec. 1971.*

Problems of environmental pollution as a result of industrialization and urbanization are reviewed. Chief chemical air pollutants are discussed. The principal sources of sulfur dioxide in city air are home heating, industry, and vehicles. The sulfur dioxide emission in France amounts to 2 million tons/yr, and in Paris to 40,000 tons/yr. Carbon monoxide, unburned hydrocarbons, nitrogen oxides, ashes, soot, and mineral dust are important air pollutants. City air pollution is characterized by a great complexity of the phenomena. It has insidious character due to the chronic exposure of the inhabitants. The costs caused by air pollution in the U.S.A. are evaluated to $60/yr/inhabitant. The corresponding value for France lies at $12. Large investments by different industries for air pollution control are cited. Regulations in France regarding air pollution are reviewed. Special protection zones were assigned in Paris in 1964, and systematic boiler inspections were carried out. As a result, a decrease of 40% in acidity, and a decrease of 30% in black smokes were found 6 yrs later, despite an increase of 40% in combustible consumption. Black smoke in automotive emissions is prohibited, and the CO content in exhausts from idling engines is limited to 4.5%.

18576 APTIC NO. 37548

Murphy, James L., Leo J. Fritschen, and Owne P. Cramer

RESEARCH LOOKS AT QIR QUALITY AND FOREST BURNING. *J. Forestry, 68(9):530-535, Sept. 1970. 33 refs.*

The present state of knowledge and current research efforts on forest burning and air quality are discussed. Possible air pollution control measures are presented, including meteorological smoke management and fire behavior management. Slash disposal methods other than burning are reviewed. Hydrocarbons, carbon monoxide, carbon dioxide, and particulate matter are considered as products released by the combustion of woody material. The most valid comparisons between air pollution situations must be based not on total emission but on actual concentrations and durations wherever the pollutants may become a problem. The fire control specialist bases his decision to burn a given slash area on a combination of predicted and observed slash and weather factors. Now, researchers suggest including conditions for adequate smoke dispersal. The great bulk of emissions from wood combustion are either water soluble or act as condensation nuclei. Thus, an actively condensing and precipitating cloud system could be an effective cleansing agent. Fuel treatment and manipulation, sophisticated ignition techniques, and fuel booster systems will provide the slash burning manager with tools for modifying the burning operation and minimizing deleterious effects on air quality. Total wood utilization is improving and this means less need for slash disposal in the future.

18577 APTIC NO. 37340

Neelen, G. T. M., L. G. H. Ortegren, P. Kuhlmann, and F. Zacharias

STIRLING ENGINES IN TRACTION APPLICATIONS. *Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, 32p. 13 refs. (Paper A26.)*

The principle of the Stirling engine is explained and the most important characteristics of a new engine with specific power are described. This engine, which will be tested on a passenger bus, is comparable with a large number of diesel engines in terms of specific weight, specific volume, and efficiency. These features, plus clean exhaust gases, quiet operation, and increased torque at decreased speeds, make the Stirling engine a potentially suitable replacement for existing heavy traction engines. Work is also under way on a double-acting engine, using hydrogen as the working medium, whose specific weight will be little more than that of a gasoline engine. The Stirling engine already satisfies the 1975 and 1980 Federal emission standards for carbon monoxide and hydrocarbons; a car equipped with an exhaust recirculation system would also meet the 1980 requirements for nitrogen oxides.

18578 APTIC NO. 37449

Oelert, Henning H.

ASPECTS OF THE EMISSION OF GASEOUS OXIDES FROM AUTOMOBILES. *(Aspekte der Emission gasfoermiger Oxide aus Kraftfahrzeugen). Text in German. Staub, Reinhaltung Luft, 32(1):12-19, Jan. 1972. 69 refs.*

In the combustion process in automobile engines, carbon dioxide, carbon monoxide, nitric oxide, and water develop; sulfur dioxide develops as a byproduct. Of these substances, CO and NO usually develop in noticeable but not dangerous concentrations. Extensive measurements in a busy street in Berlin (2000 automobiles per hour in one direction) yielded maximum half-hour-averages of 60 ppm and diurnal averages of 30 ppm. The long-term average was markedly lower; the dilution by dispersion clearly followed an exponential function. The contribution of automobiles to the total emission is negligible for SO2; for carbon monoxide and the oxides of nitrogen, it is considerable. Legislators show a tendency to reduce presently existing limit concentrations for these substances as soon as possible. The U. S. intends to reduce the CO limit values by 85%; Japan, by 36%; and Sweden, by 50%. In the Federal Republic of Germany, an emission limit of 30 ppm is demanded for CO and 0.5 ppm for NOx. Carbon monoxide is the product of incomplete combustion. The fuel to air ratio, mixture formation, and distribution play an important role. For the formation of NO the temperature in the combustion chamber is almost the sole determining factor. To reduce these pollutants, several methods are available. One is influencing the fuel composition. Operation with natural gas and lean mixtures reduces the power by 20%; but it also reduces NO development by 90% and CO by 99%. The addition of an efficient ignition accelerator improves combustion and reduces CO concentration; the NO production increases, however. Water added to the air reduces the temperature in the combustion chamber and thus also NO emissions. Further measures concentrate on mixture formation, ignition timing, design of the combustion chamber, and fuel to air ratio. A review of these measures including thermal and catalytic afterburners, installed behind the engine, is given.

18579 APTIC NO. 37464

Okuno, T., M. Tsuji, and N. Takada

ON THE GC-MS ANALYSIS OF AIR POLLUTANTS FROM COMPOUND FERTILIZER PLANTS

(PHOSPHATE ROCKBASE). (Kasei hiryo kojo (Rinkoseki ryusan bunkai hoshiki) yori hassei suru taiki osen busshitsu no GC-MS bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):101, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The qualitative analysis of organic compounds released into the air from phosphate fertilizer manufacturing plants were carried out in order to give a basis for preventing irritating malodors, which are considered to be due to the above compounds. Powder of the product in process (phosphate rock which has undergone decomposition by sulfuric acid), is heated to approximately 100 C to release the gases. These gases are analyzed by means of gas chromatography and mass spectroscopy. Many aldehydes and ketones were found. The sulfur compounds detected are considered to be the main cause of the malodor.

18580 APTIC NO. 37224

Onishi, Shigeru and Yui Saburo

STRATIFIED CHARGE ENGINE. *(Assignee not given.) U. S. Pat. 3,572,298. 17p., March 23, 1971. 10 refs. (Appl. Jan. 6, 1969, 8 claims).*

Lean air-fuel ratios, while reducing exhaust emissions from gasoline engines, increase fuel consumption and adversely affect thermal efficiency. Stratified charge systems designed to make use of lean air-fuel ratios improve thermal efficiency at part load operation but not at all loads. Morever, stratified charge engines developed to date require expensive attachments and do not provide sufficient control of engine exhausts. A new stratified charge engine attains stratification over the entire load range without the need for special attachments. Because atomized fuel particles are injected into the combustion chamber at a suitable angle against the scavenging or swirling air stream, the mixture containing the fuel particles is thoroughly spread over the inner surface of the cylinder head. The system comprises a reciprocating piston, a cylinder with an exhaust port and a scavening port that can be opened or closed by the movement of the piston, and a fuel injection nozzle in the cyclinder head. The nozzle is directed against the swirling stream of fresh air to provide the combined action for stratification of the combustible mixture along the cylinder wall. From idling to medium load, engine fuel consumption is close to that of conventional diesel engines. Under full-load conditions, it is comparable to that of gasoline engines. No additional control devices are required for reduction of carbon monoxide, hydrocarbons, and nitrogen oxides.

18581 APTIC NO. 37604

Pluequet, Heinz

DIESEL ENGINES FOR MINES. *(Dieselmotoren fuer Grubenlokomotiven). Text in German. Glueckauf (Essen), 108(3):105-108, Feb. 3, 1972. 6 refs.*

Diesel engines for mines must have low carbon monoxide emissions. Neither during idling nor during partial or full load operation may the CO emission exceed 0.05% by volume for a new engine and 0.12% after longer operation. This low emission value is achieved with chamber engines rather than with direct injection engines. Chamber engines with preliminary combustion and afterburning in the main combustion chamber have more complete combustion which is brought about by an intensive mixture preparation and an afterburning process following the preliminary combustion process. Such engines (particularly the FM 716 by Deutz) emit only 30% of the emissions of conventional engines; this is true not only for Co but also for hydrocarbons and nitrogen oxides. Moreover, smoke development of such diesel engines is considerably lower.

18582 APTIC NO. 37568

Prasek, Edward

MEASURING SOME TOXICITY COMPONENTS OF COMBUSTION GASES IN TRACTION ENGINES. *(Pomiary niektorych toksycznych skladnikow spalin z zilnikow trakcyjnych). Text in Polish. Ochrona Pracy (Prague), 25(12):20-23, 1971. 7 refs.*

The composition of exhaust gases of traction engines (rotary piston engines) was analyzed in dependance of rpm and engine load (throttle opening). Exhaust gases were analyzed for carbon monoxide, hydrocarbons, carbon dioxide, oxygen, hydrogen, and methane. The study was carried out under steady-state conditions on an engine testing bench, with Polish engines S-21, 116 C(Fiat 125 P), and ZM Ursus. Concentration of CO and hydrocarbons in the exhaust gases depended on rpm and on load. Increase in load resulted in increased emission of these components. Under steady-state conditions of the engine run, the highest CO emission occurred at maximum throttle openings, and the CO concentration in the exhaust gases was highest at idling. Carbon monoxide emission from the crankcase, was negligible. Unburned hydrocarbons formed 1-3% of the crankcase emissions, which is about 40% of the total hydrocarbon emissions from piston engines. The composition of hydrocarbons in the crankcase is similar to that of the original fuel. The toxicity of Piston engine emissions can be compared independently of their output and capacity with the use of parameters of the unit emission of CO and hydrocarbons.

18583 APTIC NO. 37585

Prasek, Edward

VALUATION OF TOXICITY OF COMBUSTION GASES IN TRACTION-ENGINES. *(Ocena toksycznosci spalin z silnikow trakcyjnych). Text in Polish. Ochrona Pracy (Warsaw), 25(10):18-19, 1971.*

Sources of toxic combustion gases, including traction engines, are identified and volume data are given for the major components of the gases. Permissible concentrations established for the compounds in Russia are cited. A method of expressing the toxicity of combustion gases in terms of coal oxide is outlined. The method allows piston engines to be compared independently of their power-stroke volume and compression degree.

18584 APTIC NO. 36974

Quebedeaux, W. A., Jr.

CAN A COOLING TOWER BE A NUISANCE? Preprint, Cooling Tower Inst. 4p., 1967. (Presented at the Cooling Tower Institute Meeting, Houston, Tex., Jan. 1967.)

Normally, the discharges from a cooling tower are not considered to be air pollution as such. However, a cooling tower can be a nuisance in fact when its discharges interfere with highway visibility or cause road surfaces to become slick and wet. If a new tower is not to cause nuisance, it should be placed far enough back from a traveled roadway, or higher in the air, or equipped with mist eliminators.

18585 APTIC NO. 37241

Raihle, A.

ALMOST EXCLUSIVELY AN INLAND BUSINESS. THE SITUATION OF THE SWEDISH SCRAP METAL TRADE. *(Fast ausschliesslich ein Binnengeschaeft. Die Situation des schwidischen Altmetallhandels). Text in German. Metall (Berlin), 26(2):163-164, Feb. 1972.*

Sweden has but one copper producing plant with an annual capacity of about 50,000 tons of copper. About 25,000 to 30,000 tons are produced from Swedish ore and about 5000 to 6000 tons are produced from Swedish scrap. The rest is produced from imported scrap and ore. This plant has presently enormous difficulties because of the existing rules concerning the incineration of scrap material. The problem of incineration of cable scrap is particularly severe. The Swedish Environmental Protection Authorities are very strict. They demand a halt of the the incineration without waste gas cleaning everywhere. Large sums of money are thus invested into plants for waste gas cleaning. A new plant has recently been taken into operation and an expansion of the plant has already been planned.

18586 APTIC NO. 37562

Reimer, Hans

REMOVAL OF PLASTIC WASTE BY MEANS OF INCINERATION. *(Beseitigen von Kunststoffhaltigem Muell durch Verbrennen). Text in German. Muell Abfall, 4(1):19-21, Jan. 1972. 7 refs. (Presented at the Muelltechnischen Kolloquium des Forschungsund Entwicklungs-Instituts fuer Industrie- und Siedlungswasser wirtschaft der Technischen Universitaet, Stuttgart, West Germany, Oct. 15, 1971.)*

The incineration of plastic waste causes problems deriving from the fact that plastic material develops gases. Since the combustion temperature in the incineration plant has to exceed 850 C in order to avoid bad odors and the temperature level must not exceed 350 C for dedusting the flue gas, the flue cases have to be cooled down by water or air. In this case, however, the flue gases get into direct contact with metallic material causing corrosion because of the content of chloride in the plastic waste, forming ferrochloride in a reducing atmosphere, and peeling the material. Methods against corrosion are adding of secondary air which prevents the formation of inhomogeneous flue gas concentrations and avoiding the use of metallic material up to a grate height of 2m. Tests are given to bind the developing chloride by physical or chemical means like dolomite. Concerning the emissions of hydrochloric acid, the concentration in the flue gases rarely exceeds 1000 mg/N cu m, and is expected to raise to 2000 mg/cu m in 1980. The emission concentration of hydrofluoric acid amounts to 8 10 mg/cu m.

18587 APTIC NO. 37312

Robbins, John A. And Franklin L. Snitz

BROMINE AND CHLORINE LOSS FROM LEAD HALIDE AUTOMOBILE EXHAUST PARTICULATES. *Environ. Sci. Technol., 6(2):164-169, Feb. 1972. 18 refs.*

Preliminary experiments indicate that bromine and chlorine are lost relative to lead in particulate matter present in fresh automobile exhaust from combustion of leaded gasoline. The loss rate for bromine is much greater than for chlorine during the first hour, and the rate is apparently not affected by the presence or absence of sunlight during this time. The measured loss rates may be accounted for quantitatively by assuming outward diffusion of halide ions to particle surfaces where they are volatilized. With additional information, especially simultaneous particle size distribution measurements, alternative models could be examined using techniques developed in this work. (Author conclusions)

18588 APTIC NO. 37496

Ruckelshaus, William D.

ENVIRONMENTAL PROTECTION AGENCY. MOTOR VEHICLES. FEDERAL CERTIFICATION TEST RESULTS FOR 1972 MODEL YEAR. *Federal Register, 37(24):2731-2737, Feb. 4, 1972.*

The average emission levels measured for each 1972 model year motor vehicle certified by the Environmental Protection Agency as of Nov. 9, 1971 are listed. The emission levels summarize the test data developed in the EPA program to determine conformity of new models with Federal standards for the control of air pollution caused by motor vehicles. The levels cover both exhaust emissions (hydrocarbons and carbon monoxide) and evaporative emissions (hydrocarbons) of light and heavy-duty vehicles.

18589 APTIC NO. 36930

Sallee, G. P.

STATUS REPORT ON AIRCRAFT AND AIRPORTS AS SOURCES OF POLLUTION. *Society of Automotive Engineers, Inc., New York and Dept. of Transportation, Washington, D. C., Soc. Automot. Eng.-Dept. Transport., Conf. Aircraft Environ., Proc., Washington, D. C., 1971, p. 21-27. 4 refs. (Feb. 8-10, Paper 710318.)*

The sources of pollution from aircraft and airports are reviewed with emphasis on the industry s current understanding of the magnitude and control technology applicable to such sources. The progress of industry s activity in reducing pollution from aircraft is examined, including research directed at defining the impact, source strength, and applicable control technology. Potential sources of pollution at an airport include aircraft, service vehicles, fuel farms, passenger traffic, power stations, maintenance facilities, shipping, mass transit, and small business, all contributing to emissions of carbon monoxide, nitrogen oxides, sulfur oxides, hydrocarbons, particulates, dirt, dust, various forms of water pollutants, and solid waste matter.

18590 APTIC NO. 37447

Schaefer, H.

THE POWER SUPPLY OF HOMES WITH RESPECT TO THE INFLUENCE OF ENVIRONMENTAL PROTECTION. *(Die Wohnungsenergieversorgung unter dem Einfluss des Umweltschutzes). Text in German. Preprint, Technische Univ. Munich (West Germany), Inst. fuer Energiewirtschaft und Kraftwerkstechnik, 12p., 1971. 1 ref.*

Power consumption by individual homes rose in the last ten years by an average 11%/year. In 1970, one household consumed about 1900 kWh. By 1980, this amount will have gone up to 3600 kWh. Over the next 30 years, the power demand by individual households will quadruple. Not only the demand of electricity but also the demand for remote heating will increase. The increased trend toward remote power supply will markedly reduce pollutant emissions in densely populated areas, even when the higher emissions caused by power and remote heat production is taken into consideration. The small individual heaters would have to be abolished since they cannot be operated with optimum efficiency. The higher demand for remote heat will make waste-heat utilization from power stations more economical. The problem of waste heat utilization produced by air conditioners and refrigerators remains to be studied. Such waste heat could very likely be used for the heating of water.

18591 APTIC NO. 37642

Schock, D. and A. Dahlmann

EMISSION REDUCTION IN CUPOLA FURNACE THROUGH NATURAL GAS SUPPLEMENTAL FIRING. *(Emissionsminderung an Kupoloefen durch Erdgaszusatzfeuerung (Kurzauszug). Text in German. Luftverunreinigung, 1969:10-14, Oct. 1969. 4 refs.*

Experiments were carried out over a year-long period to determine to what degree natural gas can be partially substituted for coke in an iron foundry in order to reduce undesirable emissions. An 800 mm diameter cold-blast cupola furnace was used. The furnace was equipped with four nozzles for coke combustion and six tunnel burners for the complete combustion of natural gas at a fuel-air ratio of 1.05. The sulfur dioxide concentration dropped from 0.25 g/cu m at 15% coke to 0.10 g/cu m at 6% coke. However, the overall dust emission increased with an increase in the percentage of natural gas substituted for coke. The coarse dust fraction (greater than 36.39 micron) rose from 45.2% at 15% coke to more than 77.6% at 9% coke and to 87.3% at 6% coke. Decreases in carbon and sulfur and increases in manganese and silicon in the metal were noted with a decrease in coke, when using gas in combination with coke. Two possibilities exist for reducing emissions without lowering the quality of the end product: afterburning of the reduced gases by the addition of air above the gas burners or operating a furnace solely with gas.

18592 APTIC NO. 37524

Schoenborn, Hans-Hellmuth

TYPES, QUANTITIES, AND COMPOSITION OF PLASTIC MATERIAL. *(Arten, Mengen und Zusammensetzung von Kunststoffen). Text in German. Muell Abfall, 4(1):1-9, Jan. 1972. 21 refs. (Presented at the Stuttgart University Muelltechnisches Kolloquium 21st, Oct. 15, 1971.)*

In 1970 in the Federal Republic of Germany, the percentage of plastic material in refuse was 46% for polyolefins, 11% for polyvinyl chloride, and 31% for polystyrenes. When burning the plastic material in an incineration plant with a high surplus of oxygen, the developing gases are mostly carbon dioxide and water. However, when plastic waste is burned without sufficient oxygen, carbon monoxide develops which affects the formation of hemoglobin. Plastic waste containing nitrogen develops ammonia and ferrocyanide. Polyvinylchloride develops hydrochloric acid. However, natural material like wool, felt, and leather develop harmful gases like sulfur dioxide.

18593 APTIC NO. 37590

Schulz, Hans and Mohammed Munir

SULPHUR COMPOUNDS IN PETROLEUM AND PETROLEUM PRODUCTS. *(Schwefelverbindungen in Erdoel und Erdoelprodukten). Text in German. Erdoel - Kohle (Hamburg), 25(1):14-21, Jan. 1972. 17 refs.*

The sulfur compound content of various hydrocarbon products, i.e., natural gas, Libyan crude oil, Safaniya crude oil, coal tar, and mineral oils, was investigated by gas chromatography with a microcoulometric detector. Retention indices of the compounds and the characteristics of the microcoulometric detector were evaluated. The sulfur compounds of the natural gas were in the range C1-C5. The composition of thiols and thiaalkanes were compared; the carbon skeleton in aliphatic thiols and thiaalkanes is similar in principle to that of mineral oil paraffins, but with a certain suppression of branched structures for thiols. Safaniya crude oil, with a total sulfur content five times higher, had a substantially lower content of sulfur compounds in the low boiling range up to 120 C b.p. than Libyan crude oil. Cyclic sulfur compounds dominated the high boiling range of both crude oils. Exact sulfur distribution in mineral oils up to 300 C b.p. was obtained from parallel chromatograms of hydrocarbons and sulfur compounds. The sensitivity value for rapid determinations of total sulfur in gases was 0.035 mg S/cu Nm.

18594 APTIC NO. 37488

Shahed, S. M. and H. K. Newhall

KINETICS OF NITRIC OXIDE FORMATION IN PROPANE-AIR AND HYDROGEN- AIR-DILUENT FLAMES. *Combustion Flame, 17(2):131-137, Oct. 1971. 10 refs.*

Spectroscopic techniques were used to measure the rate of formation of nitric oxide in high pressure combustion processes employing propane-air mixtures and hydrogen-air-diluent mixtures as fuel and oxidizer. In all cases significant formation of nitric oxide occurred primarily in post-flame combustion gases; pre-flame or in-flame reactions appeared to be unimportant insofar as nitric oxide formation is concerned. Dilution of the initial fuel oxidizer mixture with inert materials markedly and predictably reduced the rates of nitric oxide formation. This effect, which results from a reduction in combustion temperature, is most pronounced during early stages of nitric oxide formation following flame front arrival, and diminishes as nitric oxide approaches chemical equilibrium levels. (Author abstract modified)

18595 APTIC NO. 37331

Shelef, Mordecai and Haren S. Gandhi

AMMONIA FORMATION IN CATALYTIC REDUCTION OF NITRIC OXIDE BY MOLECULAR HYDROGEN. *Ind. Eng. Chem. Prod. Res. Develop., 11(1):2-11, 1972. 21 refs.*

Ammonia formation during removal of nitric oxide under reducing conditions is a major problem in the catalytic treatment of automobile exhaust because it is subsequently reoxidized to nitric oxide in a catalytic converter designed for the oxidation of carbon monoxide and hydrocarbons. The formation of NH3 in synthetic gas mixtures of hydrogen and small concentrations of NO over supported base metal oxide catalysts was studied as a function of temperature, space velocity, and NO concentration. With all the catalysts, the amount of NH3 formed went through a maximum as the temperature was raised. The temperature of this peak was different for each catalyst as was the maximum NH3 concentration. The fraction of NO converted to NH3 increased with decreasing NO concentrations. The presence of carbon monoxide led to increased NH3 formation which occurs when the surface concentration of NO is lowered, because nitrogen formation becomes less probable, and these results are consistent with that model. The presence of oxygen has a large effect on the activity of the base metal catalysts and on the position of the NH3 peak along the temperature scale. (Author abstract)

18596 APTIC NO. 37762

Simpson, John W.

THE ECONOMICS OF ENERGY. *Preprint, Franklin Inst., Philadelphia, Pa., 16p., 1972. (Presented at the Franklin Institute Lectures on Electricity and Ecology, Philadelphia, Pa., Feb. 16, 1972.)*

The demand for fossil fuels in the United States is outstripping production of gas, oil, and coal, resulting in rising prices. The rate of fuel consumption energy has grown to the point where a substantial portion of our easily recoverable fuel reserves have been depleted. At present, coal accounts for about 55% of all steam electric power generation; the shares for natural gas and oil are 29 and 14%. Estimates of coal reserves indicate that they should last hundreds of years, but the problem is whether or not they are economically recoverable. The major cost of coal as a fuel is presently the environmental cost. Natural gas, petroleum, low-sulfur residual fuel oil, and nuclear energy as alternatives have their disadvantages. But nuclear energy, because of its minimal effects on the environment, is the most important ecologically. Comparative costs for fossil-fuel plants, including control equipment, and nuclear generated plants are discussed. Some solutions to the dilemma are presented, including coal gasification, waste heat recovery, reactors, and cryogenics.

18597 APTIC NO. 37365

Terada, Hiroshi

EXPERIMENTS ON THE FORMATION OF NITROGEN OXIDES BY A SMALL BURNER. *(Kogata bana ni yoru chisso sankabutsu seisei ni kansuru jikken). Text in Japanese. Preprint, Science Council of Japan, Tokyo, 4p., 1971. 1 ref. (Presented at the Symposium on Combustion, 9th, Tokyo, Japan, Dec. 3-4, 1971.)*

Various fuels were burned using a small test furnace; temperature distribution and nitrogen oxides formation were measured in addition to the ratio of nitrogen fuel additives changing into NOx. Fluctuations were measured by controlling the amount of heat absorption by the surrounding wall of the combustion chamber by six silicon heaters placed along the wall. The diameter of the combustion chamber was 28 cm; the gas burner had two tubes, and flames were completely pre-mixed. For oil combustion, a 20 g/hr aerosol jet atomizer was used. Gaseous nitrogen compounds were added to the combustion air and liquid additives were mixed with fuel directly. Combustion gases were sampled by a ceramic tube and analyzed by air pollution monitor NX-130 and NEDA method. The cooling speed of combustion gases could be changed by controlling the wall temperature to 1400, 1100, and 700 C. Temperature distribution could be calculated from calculations of heat absorption. When using three nozzles instead of one under the same wall temperature condition, cooling speed was fast and NOx formation was limited. The temperature of propane gas combustion products was slightly higher than that of natural gas, and NOx formation increased. Kerosene combustion gas temperature was considerably lower than that of gas fuels, and NOx production decreased. The amount of NOx formation in combustion gas can be controlled by the temperature of environmental flame; by controlling the cooling speed of combustion gas, the quantity of NOx formed can be changed to a considerable extent. When simple nitrogen compounds such as ammonia and pyridine are added to the fuel, they change easily into NOx; but the exchange rate can be controlled by the temperature by as much as 90% under certain conditions.

18598 APTIC NO. 37140

Wedin, Bertil

AIR- BORNE PARTICLES: CAN POLLUTION CONTROL TECHNIQUES BE AS USEFUL FOR HOSPITALS AS FOR INDUSTRY? (Luftburna partiklar: Kan sjukvarden gora samma vinst som industrin?). Text in Swedish. Tek. Tidskr., no. 2:28-30, 1969.

There is a relationship between hospital infections and air-borne microorganisms. Staphylococci, pseudomonas, and gram-negative bacteria borne by small particles over short distances, are resistent to many antibiotics. Clean air is required for operations and other activities in hospitals. Man was the chief source of particles of 1.34-2.60 micron in diameter that sediment at a rate of 80 cm/hr. Particles from other sources, being larger, sediment more readily. In rooms with vertical laminar flow, the number of air-borne microorganisms drops very rapidly. Sterile surgery air is, however, no final solution to contamination problems. No norms have yet been established for particle and microorganism contents in hospital air. Alarm devices detecting definite particle or bacteria concentrations could be built utilizing the characteristic ultraviolet absorption of nucleotides and proteins. Instruments for analysis, the mass concentration measurement of organic aerosols, and flame detectors are mentioned.

18599 APTIC NO. 37372

Yamaki, Naoomi

EXHAUST GAS POLLUTION AND FUEL. *(Haiki gasu kogai to nenryo). Text in Japanese. Preprint, Japan Society of Mechanical Engineering, Tokyo, 17p., 1971. 40 refs. (Presented at the Seminar on Environmental Pollution by Internal Combustion Engine and its Countermeasure, Tokyo, Japan, Nov. 29-30, 1971.)*

The relationship between fuels and automotive exhaust gas, and various components of exhaust gas which are regarded harmful pollutants are reviewed. Tests on exhaust gas using lead gasoline and non-lead gasoline showed that the exhaust contained 23 to 50% aromatic hydrocarbons. Omission of lead from gasoline results in an increase of aromatic hydrocarbons in exhaust, and consequently increases toxic aromatic aldehydes. When the hydrocarbon composition in fuels is the same, non-lead gasoline emissions contain 10 to 14% more aldehydes than lead gasoline. Theoretically, 20 to 30% of the total lead supply is contained in the exhaust deposit of a car with a 20,000 to 30,000 mileage. Therefore, 70 to 80% of the entire lead content in the deposit and lubricant is emitted in the air. A car driving in a city emits 20 to 60% of lead supply; the rest is accumulated in the exhaust system. Of the emission, 27 to 39% are particles of more than five micron which settle quickly; the rest is suspended in the air. Alkyl lead which is added to gasoline as an antiknock agent increases the amount of lead emission, but it also lowers the catalytic action of purifying exhaust gas. The effect of the catalyst decreases in proportion to the amount of lead additive. By using nonlead fuel, the exhaust emission standard could be met successfully by use of a catalyst, even after 50,000 miles.

18600 APTIC NO. 37368

Yanagihara, Shigeru

EXHAUST GAS FROM VARIOUS MOTORS (OTHER THAN GASOLINE AND DIESEL ENGINES). *(Sono ta no gendoki no haishutsu gasu). Text in Japanese. Preprint, Japan Society of Mechanical Engineering, Tokyo, 18p., 1971. 15 refs. (Presented at the Seminar on Environmental Pollution by Internal Combustion Engine and its Countermeasure, Tokyo, Japan, Nov. 29-30, 1971.)*

Exhaust gases from sources other than gasoline and diesel engines are reviewed. Stratified charge engines have low emission levels, and less than 70% catalytic purification rate will suffice to meet the emission standards. One characteristic of a stratified charge engine is its excellent fuel consumption rate at partial load, and recycling of exhaust gas means the loss of this strength. If nitrogen oxide standards can be met without recycling exhaust, stratified charge engines will be one answer. Gas turbines are presently used for aircraft. The power output is large and thermal efficiency is excellent when load is maintained. Problems of weight, space, thermal efficiency, emission gas, responses, reliability, and engine brake have not been solved for automobile use. Gas turbines present no problem as far as carbon monoxide and hydrocarbon emissions are concerned, but NOx standards have not been reached. The vapor cycle engine is advantageous from the standpoint of emissions, but its performance is inferior to gasoline engines and gas turbines, and technical improvements are required. Among combustion engines, the vapor cycle engine emits the least amount of pollutants, but more than 30% thermal efficiency is difficult to achieve. Exhaust gases of reciprocating engines and continuous combustion engines are discussed.

18601 APTIC NO. 37556

Zegel, William

WHAT S GOING OUT THE STACK? Ind. Finishing (Indianapolis), 46(12):13-15, 16B, Dec. 1970.

Stack tests were run at a coil-coating plant without any air pollution control devices in operation to obtain the true emissions from ovens and boilers. The tests included measurements of stack gas velocities and temperatures, and the concentrations of nitric oxide, nitrogen dioxide, total aldehydes as formaldehyde, carbon monoxide, carbon dioxide, total hydrocarbons as propane, and particulates. From the measured emissions, emission factors based on the rate of burning gas and the rate of application of volatile material to the strip were computed. The hydrocarbons were the largest emissions, the main proportion of the hydrocarbons were aromatics containing 8-10 carbon atmos. Emissions of carbon monoxide, nitrogen oxides, and even aldehydes were not large when compared to many industrial processes or even to automotive equipment. The emission factors can be used to estimate emissions at similar plants without control devices.

18602 APTIC NO. 36979

Zhabotinskiy, A. M., A. G. Malenkov, N. M. Yasinov, L. A. Gussak, and L. M. Shabad

ON THE CONTENTS OF CANCEROGENIC AND TOXIC COMBUSTION PRODUCTS IN EXHAUST GASES OF COMBUSTION ENGINES WITH SPARK AND ANTECHAMBER -- TORCH IGNITION. *(O soderzhanii kantserogennykh i toksichnykh produktov sgoraniya v vykhlopnykh gazakh dvigateley vnutrennego sgoraniya s iskrovym i forkamernofakelnym zazhiganiyami). Text in Russian. Izv. Akad. Nauk SSSR, Ser. Biol., vol. 6:908-912, Nov.-Dec. 1964. 11 refs.*

A forechamber jet ignition engine was tested that is technically and economically superior to a spark-ignition engine and that satisfies public health criteria, especially for carcinogens. Exhaust gases from this engine contain 15-20 times less 3,4 benzpyrene than those of combustion engines with spark ignition. Emissions of carbon monoxide and other toxic products of incomplete combustion are practically nonexistent. Tests of other engine designs are also reported.

18603 APTIC NO. 37005

Zimmermann, F. J.

NEW WASTE DISPOSAL PROCESS. *Chem. Eng., 65(17):117-120, Aug. 25, 1958.*

The wet oxidation of wastes is a new continuous method of combustion with air at high pressures which oxidizes organic matter dissolved or suspended in water. Wastes are burned with water present as completely as the usual method of first evaporating the water and then incinerating the dried residue. The end products in both cases are steam, nitrogen, carbon dioxide, and ash. Another asset of this method from an economic viewpoint is power, i.e., chemical or energy recovery from cheap fuel sources.

18604 APTIC NO. 37095

Zimmermann, F. J.

WET AIR COMBUSTION. *Ind. Water Wastes, 6(4):102-106, July-Aug. 1961. (Presented at the American Chemical Society.)*

Wet air combustion is the method of burning a fuel in the presence of water in liquid phase. Anything capable of burning that stays dissolved or suspended can be oxidized in the presence of water at temperatures between 100 C and the critical temperature of water, where water ceases to exist in the liquid phase. Principle components of a continuous wet air combustion system comprise an air compressor run by a synchronous motor, a liquor pump for introducing the fuel and water, heat exchangers, a reactor, a gas separator between the heat exchangers, and a gas expansion engine. The whole system is kept at a predetermined constant pressure by setting a back pressure valve in the gas line located immediately after the gas separator. The most commonly used fuels in wet air oxidation are those already containing water, such as industrial wastes, sewage, and coal washings. The oxidation of sewage sludge by wet air combustion is discussed. Performance data, including effluent total solids, volatile solids, and chemical oxygen demand are given.

18605 APTIC NO. 37741

Zinner, K.

THE ATTRACTIVE RESEARCH PROBLEMS CONCERNING THE COMBUSTION ENGINE. *(Ueber die attraktiven Forschungsprobleme des Verbrennungsmotors). Text in German. Motortech. Z. (Stuttgart), 33(3):96-99, March 1972.*

The combustion engine still poses many unsolved problems. The emission of toxic and annoying components with the exhaust gas gets the greatest attention. The exhaust gases of Otto engines contain carbon monoxide and nitric oxide in considerable concentrations as well as hydrocarbons. In diesel engines, soot must be added to these components. If there is sulfur in the fuel, the exhaust gases of course contain also sulfur compounds. The emission of these substances threatens the further existence of the combustion engines as a power source for street vehicles. The elimination of these substances through modification of the combustion process or through additives is still not feasible. Research work is necessary for the survival of combustion engine. The task is enormous, but a solution is not impossible. Any research work in this direction is justified because all other drives, e.g., the battery-operated electric engine, is far from being able to offer what the combustion engine offers.

CONTROL METHODS

18606 APTIC NO. 36951

VDI Verein Deutscher Ingenieure Kommission Reinhaltung der Luft, Duesseldorf (West Germany), Fachausschuss Aufbereitungs und Mischanlagen fuer den Bituminoesen Strassenbau

RESTRICTION OF EMISSION. PRETREATMENT AND MIXING PLANTS FOR ROAD-SURFACING AGGREGATES WITH BITUMINOUS BINDER. *VDI (Ver. Deut. Ingr.) Richtlinien, no. 2283, July 1967. 16 refs. Translated from German. Israel Program for Scientific Translations, Jerusalem, 9p., June, 1970.*

NTIS: TT 68-50469/16

The surfacing of asphalt roads requires a mixture produced from a mineral aggregate and a bituminous binder. The mineral aggregate may be natural rock material (sand or gravel), crushed rock (rock fines, grit, road metal), crushed blast furnace slags, or rock dust (as filler). In order to obtain the desired grain-size composition, the mineral aggregates are mixed in a certain proportion, for which standards and codes of practice exist. Plant operation includes batching of the input aggregates, drying and heating, mixing, haulage and loading, storage, preheating of rock dust, and treatment of binder. Sources of dust formation are indicated, as well as the type of dust formed and means of reducing dust concentrations. Mechanical collectors, wet collectors, filters, and electrostatic precipitators are evaluated for this application. The release and prevention of gases, vapors, and odors are also discussed.

18607 APTIC NO. 37018

NEW FUEL COMBUSTION SYSTEM REDUCES AIR AND WATER POLLUTION. *Ocean Ind., 5(8):33-34, Aug. 1970.*

A new fuel-burning system for boilers reduces unburned hydrocarbons and solids by 90% and sulfur trioxide by 75%, although attaining small reductions in sulfur dioxide. The system is based a special emulsion burner for mixtures of fuel and water and includes fuel and water preheaters, an atomization pump, and an air blower. Flame properties are such that the efficiency of a boiler is markedly increased. In addition, the large reduction in solids emissions reduces both boiler and burner maintenance. The burner is suitable for disposal of water polluted with industrial wastes, even muds from municipal treatment plants.

18608 APTIC NO. 37148

ODOR CONTROL IN THE FERTILIZER INDUSTRY. *Agr. Chem., vol. 13:20-21, Sept. 1958.*

Odor control equipment of relatively modest initial cost has been installed at several fertilizer plants. The equipment installed at one plant is typical consisting of a compressed air-operated spray gun mounted at the top of a cooling tower used to cool condensed water for the exhaust arising from the manufacture of ammonium sulfate. The liquid counteractant is vaporized into the air stream and by molecular dispersion combines with the malodors traveling along the windstream thus masking them. By vaporizing counteractants, the malodor is neutralized whether the odors are held to the ground or dispersed horizontally or vertically by the wind currents.

18609 APTIC NO. 37219

(Inventor not given.)

PROCEDURE FOR THE MANUFACTURING AND UTILIZATION OF MATERIALS FOR DESULFURIZATION OF GASES. *(Verfahren zur Herstellung geformter Gasentschwefelungsmassen und deren Anwendung). Text in German. (Gastechnik G.m.b.H., Oberhausen (Germany)) W. Ger. Pat. 2,006,758. 7p., Aug. 19, 1971. (Appl. Feb. 14, 1970, 5 claims).*

A material with increased sulfur absorptivity (approximately 30%) and improved porosity for one-time use was obtained by mixing 700 kg iron oxide containing approximately 50% iron hydroxide for 15 min with 130 kg cement, 50 kg calcium carbonate, 120 kg sawdust, and water. The mixture was subsequently extruded as 8 to 12-mm diameter cylinders of nearly equal lengths. The cylinders were hardened for 20-24 hr and then dried with warm air or flue gas.

18610 APTIC NO. 37226

Agency of Scientific Technology (Japan)

POLLUTION CONTROL MEASURES. *(Kogai boshi taisaku). Text in Japanese. In: White Paper of Scientific Technology. p. 52-59, 1969.*

The most important measure against air pollution is development of control technique at the emission sources. As the energy sources are shifting from coal to petroleum, the amount of sulfur oxides emission is rapidly increasing. According to the records of the national monitoring network system, the sulfur dioxide concentration in Tokyo, Kitakyushu, and Amagasaki reveal alarming increases. Of the two major methods of desulfurization, one of the stack gases and the other of fuels, the former is relatively inexpensive and is suitable for installations such as thermal power plants where quantities of crude oil are consumed, but the desulfurization system itself is large and costly. Crude oil desulfurization presents many problems both technically and economically. At present, the development of economical and effective catalysts with resistance to high pressure and high temperature is set as a goal. Technical control measures against automotive exhaust gas are four: improvement of internal combustion engines; recombustion or oxidation by a catalyst; improvement of fuels and elimination of toxicity; development of new power sources.

18611 APTIC NO. 37248

DESULFURIZATION PROJECTS MUSHROOM IN JAPAN. *Oil Gas J., 69(50):39, Dec. 13, 1971.*

A number of new desulfurization processes for residual fuel and stack gases are being developed in Japan to meet the increasingly stringent regulations on sulfur. One plant will process atmospheric residue into low-sulfur (0.2%) fuel oil and petroleum coke by vacuum distillation. Other companies will use a gasification/desulfurization process that removes almost all sulfur and heavy metals from residue. The gasified desulfurized asphalt obtained with the process will be burned to run gas turbines. Activated carbon, manganese dioxide, and sulfuric acid stack-gas desulfurization processes are being designed to produce marketable gypsum as a by-product.

18612 APTIC NO. 37274

EMPHASIS ON POLLUTION CONTROL IN US DYEHOUSE DESIGN. *Text. Mon., 1972:26-27, Jan.*

Unifi s new dyeing and finishing plant in Rocky Mount, N. C., built to handle polyester double knits and warp knits of various constructions, has succeeded in eliminating the problem of noxious gases at a cost of $60,000 by use of air scrubbers utilizing both high energy input and chemical scrubbing agents. Formaldehyde vapors, fine oil fumes, organic polyesters, and biphenols are removed in the scrubber bath. Basically, the main function of the scrubbing is to emulsify the oily organic impurities extracted from an air stream in a water medium, and to hold these impurities in mechanically stable form. The correct hydrophilic-lypophilic balance is vital to have the proper solubility-absorptive relationship. The dyehouse has been completely air conditioned. Water pollution control is also described.

18613 APTIC NO. 37293

THE INAUGURATION OF THE NEW ALUMINUM PLANT PECHINEY IN VLISSINGEN BY PRINCE BERNHARD OF THE NETHERLANDS. *(Einweihung der neuen Pechiney Huette Vlissingen durch Prinz Bernhard der Niederlande). Text in German. Aluminium, 47(12):782-784, Dec. 1971.*

The new aluminum plant with 256 furnaces in Vlissingen (The Netherlands) has not been equipped with a central waste air cleaning system. After extensive experiments in the wind tunnel, it was decided to install individual groups of ventilators and gas scrubbers. The 34 ventilators with which the plant has been equipped have a throughput of 30 million cu m/hr, each ventilator has a throughput of 63 cu m/sec. In the gas scrubbers, 30,000 cu m water are atomized/hr for binding the fluorine gases. The fluorine is precipitated and recovered and returned to the production process. Air monitoring stations both of the stationary and mobile type are in operation to a distance of 18 km from the plant. The costs for installation of this system amounted to 1.68 million dollars, the power consumption amounts to 90 million kWh/yr.

18614 APTIC NO. 37343

CONTROLLING EMISSIONS FROM COKE OVENS. *Environ. Sci. Technol., 6(2):118-119, Feb. 1972.*

Since the early 1900 s, by-product ovens have become standard and collect most of the volatile material during the coking operation for conversion into useful products such as gas, tar, and ammonia liquor. Coke oven emissions contain carbon monoxide, sulfur dioxide, hydrogen sulfide, hydrogen cyanide, and phenol. Charging contributes the largest part of the emissions in the coking operation. Design and construction of a $1.5 million prototype system for smokeless charging of coke ovens has been sponsored jointly by the American Iron and Steel Institute and the Environmental Protection Agency for the past three years. The idea behind the prototype system is that if coal is fed into an oven through a sealed feed hopper and adequate suction is maintained by properly designed steam jets, pressure in the oven will never be positive during charging. National Steel Corp. is hoping to solve the environmental problems in charging, pushing, and quenching by one complete system. A completely self-contained charging system will use double collecting mains and a method known as charging on the main, a sulfur removal system to produce elemental sulfur, an ammonia destruction system, oxides of nitrogen control system, and a closed system for coke pushing and underground quenching. Another demonstration project is a coke pellet manufacturing process designed to eliminate coke oven emissions by eliminating coke ovens.

18615 APTIC NO. 37384

CALIFORNIA GETS THE AIR (AND EGR). *Automobile Eng., 79(10):18-21, Oct. 1971.*

Tighter emission limits in California have brought forth more air injection reactors and the first production applications of exhaust gas recirculation. Developments continue to appear in carburetors, evaporative emission control, and engine construction details. Buick s exhaust gas recirculation system has a metering valve between the exhaust gas crossover and the intake runners, which varies the amount of exhaust let into the intake while responding to a vacuum signal from the carburetor. Exhaust gas recirculation permits the reduction of cam overlap enough to regain smooth idle and improve low speed response. The new Buick intake manifold also contains passages for air injection reactors. All American Motors 4-bbl carburetors now feature a dual break: when cold, the choke plate pulls to a different position more suitable for cold drivability, while the warm weather position is set independently. A thermospring on Oldsmobiles and Pontiacs controls a valve that retards the vacuum pull-off for the choke in cold weather, so it then stays on longer than when warm. Carburetors have been recalibrated to increase air/fuel ratios. Chrysler adapted the charcoal canister for storage of vapor from fuel tank and float bowl, and added an overfill limiting valve and a purge control valve. The familiar transmission controlled spark and electronic controlled spark have been joined by a mechanical speed control.

18616 APTIC NO. 37408

PRECIOUS METALS IN MODERN TECHNOLOGY. ***(Edelmetalle in der modernen Technik). Text in German. Metall. Berlin, 26(1):72-73, Jan. 1972.***

The stepped-up measures against environmental pollution have called for a lead-free gasoline. In order to achieve the same antiknocking properties in lead-free gasolines as in leaded ones, a larger quantity of reforming catalyst is needed. An increase of the platinum consumption is thus expected. Automobile exhaust gases from engines driven with lead-free gasoline can efficiently be cleaned by Pt catalysts. There is a tendency though to replace these calalysts by non-precious metal catalysts. For afterburning of toxic and odorous waste gases from other sources, precious metal catalysts are preferably used. (Air pollution discussed on p. 73.)

18617 APTIC NO. 37468

Research Committee for Automobile Fuels (Japan)

REPORT OF THE COLLABORATIVE STUDY ON EXHAUST VALVE SEAT RECESSION. ***(Haiki barubu shiito risesshon kyodo kenkyu hokoku). Text in Japanese. 53p., Sept. 1971.***

Field and laboratory tests were conducted from Dec. 1970 in order to achieve comprehensive and high-degree purification of automobile exhaust gases. The tests involved evidence of the occurrence of valve seat recession; effect of valve seat recession on exhaust gases; and development of a preventive technique such as preventive agents for valve seat recession. Four kinds of cars having engine exhaust gas amounts of 360 cc, 1.3 l, 1.5 l, and 1.9 l and three kinds of trucks with loading capacities of 350 kg, 2 t, and 3.5 t were used for the experiments. The experiments were performed with non-lead gasoline, lead gasoline (TEL 0.2 cc/gal and 0.5 cc/gal), and phosphor added gasoline (P 0.7 g/cal). The influence of exhaust valve recession on exhaust gases and the effect of lead and phosphor compounds were also studied. The more the cars accelerated and the smaller the amount of engine exhaust gas, the more valve seat recession occurred. The exhaust of non-combustion hydrocarbons caused by the exhaust valve recession was apt to increase in proportion to the number of recessions. Phosphor compounds for prevention of valve seat recession was tested in different engines. It proved to be efficient, but the examination was not carried out concerning added amounts of phosphor compounds and air pollution caused by phosphor compounds.

18618 APTIC NO. 37484

NEW PICKLING LINE SYSTEM ELIMINATES POSSIBLE POLLUTION. *Filtration Eng., 3(1):4-5, Jan.-Feb. 1972.*

To eliminate possible pollution at the modern, recently occupied facility of Lake Erie Screw Corporation, in Cleveland, Ohio, the firm contracted for one of the most complete and advanced types of pickling systems. Four processing tanks were installed to provide for the required capacity of high carbon and alloy steel in coil form, which use sulfuric acid at 150-160 F. Three of the tanks are rubber-lined and brick-sheathed, two for holding sulfuric acid and the third for the pressure spray rinse, while the fourth tank is mild steel for lime. Tank foundation areas were protected against corrosion with a polyester-based lining material. An open-front six-hood exhaust system was built to provide ventilation across the tanks. The hoods lead through the wall to the exterior main ductwork and into a packed bed, crossflow fume scrubber. Hoods, ductwork, and scrubber are constructed of non-corrosive Rigidon. Before leaving the scrubber, the clean air passes through a high-efficiency mist eliminator section.

18619 APTIC NO. 37486

Dynamit Nobel A. G., Troisdorf (Wsst Germany)

SEPARATOR FOR CHROMIC ACID MIST. ***(Abscheider fuer Chromsaeurenebel). Text in German. Umwelt (Duesseldorf), 2(1):51, Feb./March 1972.***

A separator for chromic acid mists which develop during the chrome plating of metal parts, has been developed. It operates without chemicals so that the chromic acid is recovered without any contamination. The chromic acid-mist-laden waste air is passed through a casing accommodating two successive rows of droplet separating profiles of rigid polyvinyl chloride. The collection efficiency is 99%. The casing of the separator is made of Trovidur HS 15. It comes in several sizes with capacities from 500 to 120,000 cu m/hr.

18620 APTIC NO. 37487

SONIC AFTERBURNER SPEEDS MUFFLER CATALYST REGENERATION. *Diesel Gas Turbine Progr., 38(2):47, Feb. 1972.*

Catalytic mufflers for underground diesel operations and purifiers in horizontal and vertical design for two and four-cycle engines in a wide output range are discussed. Pollutant reductions achieved through the use of the exhaust purifier mufflers and with no increase in nitrogen dioxide are carbon monoxide, 95%; formaldehyde and acrolein, 85% and nitrogen oxides, 10%. Maintenance techniques required the removal of the pellets from the muffler and baking-off the carbon build-ups in a furnace, or removal of the muffler and regeneration of the pellets by burning off the carbon with an auxiliary burner. The latter approach has now been improved through incorporation of a sonic afterburner as an integral part of the catalytic muffler, doing away with the necessity for removal of the muffler. The sonic afterburner helps raise the heat level in the muffler from the normal 250-600 F to the 900 F required for burning off the carbon. Compressed air at about 20 psi, usually available from the vehicle s air-brake system, is used to create the ultrasonic shock wave for atomizing the fuel in the afterburner.

18621 APTIC NO. 37498

FORD S MICHIGAN CASTING CENTER. ENVIRONMENTAL CONTROL. *Foundry, 100(3):F8-F11, March 1972.*

More than $1 of every $10 budgeted for Ford s Michigan Casting Center was spent for environmental control. Arc melting, in six 50-ton capacity furnaces, was selected for the relative ease of containing emission -- particularly with control equipment that can be maintained easily, yet is highly efficient. Use of baghouse dry collection, which easily exceeds legal requirements, affords a completely colorless plume. The baghouses are compartmentalized so that any portions can be used as required. Eight 1250-hp fans are operated in the melting baghouse facility, which has four stacks. Dust from the melting department is collected in hoppers, after automatic shaking of the bags. Ventilation, hoods, and baffles are described, as well as lighting, noise, water pollution, fire protection, and land contamination.

18622 APTIC NO. 37536

LOW COST REMOVAL OF ORGANIC VAPOUR POLLUTANTS. *Chem. Process. (London), 17(12):9, 11, Dec. 1971.*

An economical control system for low concentrations of organic vapors combines adsorption on one of two activated carbon beds with air incineration (thermal or catalytic). The carbon beds operate on alternate adsorption/regeneration cycles: when one bed becomes saturated, it is removed and regenerated with heat provided by the incinerated gases. Since steam is not required for regeneration, the corrosive condensate is absent from the system. The estimated annual average cost of the system is $27,900 versus $46,100 for carbon adsorption with steam regeneration, and $77,400 for air incineration alone (with heat exchange). A modification of the process, using cascade adsorption, allows the solvent vapors to be recovered rather than incinerated. This alternative may also be preferred if combustion products from the process contain hydrogen fluoride, hydrogen chloride, and sulfur dioxide.

18623 APTIC NO. 37546

PICCOLI IMPIANTI SIDERURGICI. MINI-STEEL PLANT SYMPOSIUM ORGANISED BY DANIELI AND C SPA.

Iron Steel (London), 44(6):455-461, Dec. 1971.

The rapid expansion in mini-steel plants and of the Italian steel industry has been directly related to the growth and vision of the Danieli organization at Buttrio in northern Italy. The essence of the Danieli approach is to develop machines and equipment of advanced design but adapted to the working conditions in small and medium-sized production units. At the same time, a program of standardization and rationalization was implemented so that, whenever possible, items were interchangeable and could be slotted into existing schemes with a minimum of disruption. A report is presented of the symposium in October which was organized to give a complete picture of the present work of Danieli and Cie. The usual sequence of processes through a steel plant is followed from raw material treatment to the finished billet, describing examples of Danieli s work at each step. Direct reduction, scrap preparation, assisted melting, fume cleaning, tap degassing, continuous casting, rolling mills, and ancillary plant operations are considered. Fume-cleaning equipment at Danieli consists of a fume aspiration unit, a gas conduit system, a cleaning/separation unit, a discharge unit, and a regulating unit. Advantages of a wet fume cleaning system over dry systems are cited.

18624 APTIC NO. 37554

HOW THE PAPER INDUSTRY IS SOLVING AIR AND WATER PROBLEMS: CHEMICAL RECOVERY MADE POSSIBLE WITH NICKEL STAINLESS STEEL.

Nickel Topics, 25(1):4-5, 1972.

The high-speed manufacturing of quality paper depends to a large extent on the strength and corrosion-resistant properties of nickel stainless steel. Its use has now been extended to equipment for reducing air and water pollution which simultaneously recover useful chemicals. Waste chemicals from the ammonium bisulfite pulping process are concentrated in a nickel stainless steel evaporator and are then burned in a recovery furnace to generate process steam and recover sulfur dioxide gas from the furnace flue gases. All equipment in contact with SO2 at temperatures below the dew point, or used in handling aqueous SO2 solutions, is made of Type 316L or Type 317 nickel stainless steel. In addition, these and other types of nickel stainless steel are used for water recycling systems, screens for chip washing, and washers for pulp from digesters and bleaching operations.

18625 APTIC NO. 37634

HIGH-CAPACITY TUBULAR FILTERS FOR DRYING DRUMS IN ASPHALT MIXERS.

(Hochleistungsschlauchfilter fuer Trockentrommeln in Asphalt- Mischanlagen). Text in German. Aufbereitungs-Technik, 13(1):64- 65, Jan. 1972.

During the production of asphalt, the raw material is dried in a drum kiln. The developing combustion gases and the water vapor from the drying process contain a considerable quantity of dust. In extreme cases they contain a quantity of about 400 g/cu m. The drying drum is directly heated by an oil burner. The waste gases are cleaned in a dust collector and discharged. Wet or dry collectors may be used. The best collection efficiencies are obtained with dry dust collectors. A tubular filter with compressed air get cleaning proved particularly suitable for this purpose. The filter bags have a length of 2.44 m and a diameter of 114 mm. Wire mesh baskets are used as a supporting structure. The dust-laden air enters the collector below the filter bags, and the dust is collected on the external surface of the filter bags. The cleaned air penetrates the filter into the interior of the bag and passes to the subsequent ventilator. The bags are cleaned by compressed air jets lasting 0.1 sec with a pressure of 5 to 6 atm gauge. A bag filter with a capacity for treatment of 45,000 cu m dust-laden air/hr of this type has been in operation for 3 yrs without replacement of any of the filter bags. The pressure loss across the filter is 80 to 120 mm water. The dust concentration in the uncleaned gas is 170 to 200 g/cu m, in the cleaned gas less than 50 mg/cu m.

18626 APTIC NO. 37700

RECYCLING ETCHANT FOR PRINTED CIRCUITS.

Metal Finishing, 70(3):42-43, March 1972.

A continuous system for etching printed circuit boards at the Western Electric Works in Columbus, Ohio, simultaneously recovers the dissolved copper and regenerates the exhaust. The system eliminates the problem of having to stop production to replenish the etchant as well as the even knottier problem of disposing of spent etchant. The process works at only 100 F, reducing evaporation, fuming, and stress on equipment and materials. The etchant, a solution of cupric chloride and hydrochloric acid, flows continuously between spray etching machines and a plating tank. The heart of the new system is an automatic copper plating machine. Design criteria and operating details are indicated. Hydrochloric acid fumes and any chlorine liberated from the solution at the anodes are sent through a fume scrubber, where they react with sodium hydroxide to form sodium chloride and sodium hypochlorite. Later, the sodium hypochlorite solution is used to treat cyanide wastes generated by other chemical processes so that nothing goes to waste. Regeneration of the etchant is due to an electrochemical reversal of the etching process. The new system promises to save the company over $150,000 a year.

18627 APTIC NO. 37707

Fuel Assoc. (Japan), Western Branch; Japan Boiler Assoc., Osaka; and Fuel and Combustion Co., Ltd. (Japan)

RECORD OF A PANEL DISCUSSION CONCERNING DUST COLLECTION SYSTEM AND FANS.

(Shujin sochi to sofuki ni kansuru zadankai kiroku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(2):129-162, Feb. 1972.

Some of the topics discussed at this panel discussion included the noise standard of fans, the suitable pressure and pressure loss of dust collectors, the danger of explosion of dust collectors, the use of electrostatic precipitators, anti-corrosion measures for desulfurization systems, the need for care in initial starting electric fans, various types of filter fabrics, the improvement of the work environment, dust collection in food treatment plants, and the importance of installation techniques for any dust collection apparatus. Nonweave fiber has relatively little pressure change compared to woven fibers. Some of the new synthetic fibers can withstand very high temperatures. When using non-woven fiber filters, the amount of electricity required for filtering action itself is extremely small. For treating 100,000 cu m/hr of gas, 2 k Wh or 3 kW h electricity is needed. The gas, after eliminating dust, contains 20 to 100 mg/cu m particles when using glass fiber woven filters, but a non-woven fabric can often achieve a zero state, usually averaging 2 to 10 mg/cu m.

18628 APTIC NO. 37653

Aldworth, G. A.

MORE PROBLEMS VIA WASTE TREATMENT.

Can. Chem. Process., 55(10):66, 68-69, 71, Oct. 1971.

The major air pollutants which people in the process industries are likely to have to deal with are particulates, sulfur oxides, oxides, nitrogen oxides, carbon monoxide, hydrocarbons, and photochemical oxidants. Sulfur oxide scrubbing systems have been tested on several large coal or oil burning steam generators associated with thermal power plants. One system being studied for sulfur dioxide removal is the injection of dry limestone into the combustion chamber. Reduction of oxides of nitrogen has been achieved by careful design and operation of burner and combustion chamber elements. Individual stacks, high stacks, and high efflux velocities have been used to optimize dispersion. Devices for the control of air pollution include wet scrubbers, catalytic incinerations, adsorption units, mechanical collectors, electrostatic precipitators, fabric filters, and thermal incinerators. Open dumping, sanitary landfilling, and incineration for the control of solid wastes are considered. Incinerator design and input-air control are discussed, as well as the economical pit burner.

18629 APTIC NO. 37266

Alley, Forrest C.

REMOVAL OF SULFUR COMPOUNDS FROM GAS STREAMS. *(Westvaco Corp., Clemson, S. C.) U. S. Pat. 3,598,521. 3p., Aug. 10, 1971. 6 refs. (Appl. Dec. 11, 1968, 7 claims).*

A process is described for removing organic sulfur compounds and hydrogen sulfide from industrial waste gas streams by oxidizing some of the sulfur compounds and adsorbing all the organic sulfur compounds and H2S onto an activated carbon adsorbent. Prior attempts at organic sulfur compound removal were either inefficient or required specially impregnated adsorbents. However, both certain organic sulfur compounds, primarily mercaptans and disulfides, and hydrogen sulfide may be completely and economically removed from waste gas streams by contacting a gas stream of the sulfur compound-containing gas and an oxygen-containing gas with an activated carbonaceous catalytic adsorbent when the initial contact relative humidity is at least 70% at a temperature between 27 and 82C. The adsorbent may be regenerated for reuse and the gas stream passed to the atmosphere free from organic sulfur compounds and H2S. Evolution of malodorous sulfur compounds is by no means limited to the pulping industry. For instance, it is common to remove the odorous sulfur compounds during the production of gasoline.

18630 APTIC NO. 37482

Ameen, Jameil and Seymour A. Furbush

ACID GAS REMOVAL FROM GAS MIXTURES. *(Allied Chemical Corp., New York) U. S. Pat. 3,594,985. 7p., July 27, 1971. 4 refs. (Appl. June 11, 1969, 8 claims).*

Although dimethyl ethers of polyethylene glycol have been suggested for removal of hydrogen sulfide from gas mixtures, their use has been inhibited by certain disadvantages. The lower molecular weight homologs are relatively volatile so that excessive solvent losses may occur during gas processing. While higher molecular weight homologs are not excessively volatile, they are rather viscous which tends to reduce the rate of solvent flow. An improved process for treating and separating acid gas is described which involves the use of a solvent comprising a mixture of dimethyl ethers of polyethylene glycols to absorb the hydrogen sulfide and part of the carbon dioxide under superatmospheric pressure. The solvent containing dissolved hydrogen sulfide and carbon dioxide is flashed at reduced pressure to remove most of the carbon dioxide and produce the solvent. Part of the solvent is recycled to an intermediate part of the absorber, while the remaining solvent containing hydrogen sulfide is subjected to an oxygen containing gas under conditions that result in complete removal of the hydrogen sulfide. By the use of two solvent feeds to the absorber, the economy of the process is improved. (Author abstract modified)

18631 APTIC NO. 37416

Andreev, A. A., L. M. Rabinovich, L. P. Martysheva, and K. I. Neonilina

CATALYTIC PROCESS FOR RENDERING HARMLESS EXHAUST AIR FROM THE PRODUCTION OF SYNTHETIC FATTY ACIDS. *(Kataliticheskoye obezvrezhivanie otrabotannogo vozukha proizvodstva SZHK). Text in Russian. Neftepererab. Neftekhim., no. 9:38-40, 1971. 6 refs.*

The possibilities of the low-temperature catalytic afterburning of spent air containing aldehydes and ketones, formed in the production of synthetic fatty acids were investigated, and different types of catalysts were tested in the laboratory. The tests were carried out subsequently with acetaldehyde, acetic acid, and ethylene in a temperature range of 200-400 and at space velocities of 5000, 10,000, and 30,000/hr, with samplings by temperature rises of 50 C each. The high activity of aluminum oxide-platinum catalysts was found for all substances tested in a temperature range of 250-350 C with a minimum space velocity of 30,000/hr. The spent catalyst was comparable in its activity to the fresh one. Platinum contents of 0.15 and 0.56% were applied. Platinum contents above 0.15% did not yield better results. Zinc-chromium and copper-chromium catalysts showed fairly high activities above 350 C and up to 10,000/hr. Perfect purification was reached at a minimum temperature of 200 C with space velocities of 35,000-45,000/hr.

18632 APTIC NO. 37613

Arstikaitis, Arunas A.

CLEANING CONTROL FOR ELECTROSTATIC PRECIPITATOR. *(American Standard Inc., New York) U. S. Pat. 3,606,733. 4p., Sept. 21, 1971. 7 refs. (Appl. July 17, 1969, 5 claims).*

An industrial electrostatic precipitator is presented which has a rapper control for initiating a rapper cycle in response to dust weight accumulations on the collector plates. The plates are deflected downward by the weight of the dust and, after a predetermined weight increased, the deflection is sufficient to actuate a trigger for the rapper control. This differs from usual collectors which have the rapping cycles controlled on a timed basis. The time basis does not take into consideration any variations in dust loading. As a result, one or more of the sections is usually rapped more or less frequently than the desired optimum. The proposed system is more efficient, since sections are rapped after a predetermined weight of dust is accumulated. A scanner system prevents coincidental rapping of the various collector sections.

18633 APTIC NO. 37060

Ayres, Robert U. and Allen V. Kneese

POLLUTION AND ENVIRONMENTAL QUALITY. *In: The Quality of the Urban Environment. Essays on New Resources in an Urban Age. Harvey S. Perloff (ed.), Washington, D. C., Resources for the Future, Inc., 1969, p. 35-71. 27 refs.*

Environmental pollution is considered in terms of the balance between goods produced and the gaseous, solid, and liquid residues discharged to the environment from the production processes. Amounts of residues are calculated for each main sector of the economy: energy production, transportation, materials processing, industrial production, and households. Two beet sugar processes are compared to illustrate how residuals can be economically recycled back into the productive system. In contrast to the usual air-water-solids categorization, the material balance approach is designed to help in dealing with policy issues touching on the quality of the urban environment and the protection of air, water, and land resources in an urban setting. Given the possibilities for recycle and low-residual production processes, a region might discharge very little residual waste to any of the environmental media.

18634 APTIC NO. 37614

Ballennie, Peter Donald

HIGH EFFICIENCY AIR FILTER. *(Johnson and Johnson Ltd., Montreal (Quebec)) U. S. Pat. 3,606,740. 4p., Sept. 21, 1971. 11 refs. (Appl. June 5, 1969, 1 claim).*

Sock-style air filters previously have been constructed in a manner that exposes the microfibers to the air flow, and, as the air flow is usually of a relatively high velocity, peeling of the air filter media takes place and reduces the efficiency of the filter. The described air filter cartridge comprises a continuous filter medium of microfibers with a continuous porous non-woven cover on both sides of the filter medium. The medium with cover is folded over upon itself to form a plurality of side-by-side socks all opening outward in the same direction to form an air inlet. The longitudinal marginal edges of the medium and the cover forming each sock are sewn together and pleated adjacent the air inlet to form a continuous rectangular frame around the inlet. (Author abstract modified)

18635 APTIC NO. 37136

Barnebey, H. L.

ACTIVATED CHARCOAL FOR AIR PURIFICATION. *Heating, Piping, Air Conditioning, 30(3):153,160, March 1958. (Presented at the American Society of Heating and Air-Conditioning Engineers, Semi-Annual Meeting, Minneapolis, Minn., June 1958.)*

Activated charcoal adsorption is a positive method for the control of odors and other unwanted vapors. When used with heating, cooling, dust filtration, and humidity control, it permits the complete conditioning of air. Methods are presented for determining the load of contaminants to be removed and for the selection and sizing of suitable equipment. The quantity of activated charcoal required to purify air can be predicted directly from the odor removal requirements, independent of the amount of air circulated. The methods presented are based on knowledge of vapors released, analysis of air, type of occupancy, survey by smell, and experience. (Author summary modified)

18636 APTIC NO. 37143

Barnebey, H. L.

REMOVAL OF EXHAUST ODORS FROM SOLVENT EXTRACTION OPERATION BY ACTIVATED CHARCOAL ADSORPTION. *J. Air Pollution Control Assoc., 15(9):422, Sept. 1965.*

Isopropyl alcohol vapor is exhausted at a rate of 35 gallons per hour in 2000 cfm of air at 120 F from a process involving the extraction of lemon pulp by solvent. Emissions also contain hydrochloric acid droplets and fruit processing particulates. The treatment system is a combination of two removal methods. A liquid scrubber is used to remove the particulate matter and acid fumes. The scrubber uses a one Normal sodium carbonate solution recirculated over a slat-type packing; this cleans and cools the exhaust stream but does not remove the isopropyl alcohol. The scrubber is followed by the activated charcoal adsorption system, consisting of two horizontal adsorbers containing beds of activated charcoal, a condenser, and the necessary storage tanks, piping, valves, and controls. Activated charcoal removes the isopropyl alcohol vapor from the air which permits the air to pass through almost completely stripped of the alcohol or other vaporous contaminants. The solvent is removed from the charcoal bed by steam stripping and is condensed along with part of the steam. This adsoprtion-desorption cycle can be repeated many times daily for a period of years until the charcoal bed becomes contaminated with high molecular weight substances. The odor, hydrochloric acid fumes, and particulate matter are reduced to the point that they are not readily detectable. The effluent air stream contains less than 0.05 lb per hour of isopropyl alcohol.

18637 APTIC NO. 37652

Barron, A. V., Jr.

PARTICULATE AND SO2 CONTROL TECHNOLOGY FOR THE SMALL AND MEDIUM COAL-FIRED BOILER. *Combustion, 43(4):44-56, Oct. 1971. (Presented at the Industrial Conference, Lafayette, Ind., Oct. 7-8, 1970.)*

The solutions that are available to control both the stack emission of particulates and sulfur oxides from the combustion of fossil fuels are presented. Design criteria and operating variables are included for electrostatic precipitators, bag filters, cyclones, and scrubbers. Secondary erosion, throughput draft loss, hopper circulation, plugging, leaking, collecting tubes, inlet vanes, recovery vanes, dust discharge, collector arrangements and location, and duct design are considered for cyclones. Sectionalizing for low load usage, gas firing, two stage collection, hopper evacuation, and secondary shave-off are discussed for improving the basic mechanical collector. Low sulfur fuels, the removal of sulfur from coal prior to firing, and the treatment of flue gas by absorption, adsorption, and oxidation processes are mentioned.

18638 APTIC NO. 37156

Beavon, David K.

ABATING SULFUR PLANT TAIL GASES. *Pollut. Eng., 4(1):34-35, Jan./Feb. 1972.*

Claus discovered that hydrogen sulfide produces good yields of sulfur when mixed with air and passed over an iron or bauxite catalyst at an elevated temperature. The reaction is highly exothermic, but completion is opposed by high temperatures, so conversion in a fixed bed of uncooled catalyst is relatively low. The I. G. Farbenindustrie approached the problem of heat removal by first burning 1/3 of the hydrogen sulfide with air in a pressurized boiler, in which about 4/5 of the overall heat of reaction is removed by generating steam, and some of the sulfur is produced. After condensed sulfur is separated from the cooled gases, the chemical reaction is carried further toward completion by heating the gases to 400-500 F and passing them over a Claus catalyst. It is customary to carry out the reaction in a series of two or three catalyst beds, with cooling, condensation, and removal of produced sulfur after each bed. The new Beavon sulfur recovery process starts by converting all the sulfur in the tail gas into hydrogen sulfide, then cools the gas to condense out water, removing it from the reaction zone. Conversion to H2S is by both hydrolysis and hydrogenation reactions. Following the catalytic reactions which convert essentially all the sulfur compounds in the tail gas to H2S, the gas mixture is cooled to as low a temperature as is economical, and condensed water is removed. Hydrogen sulfide is extracted from the hydrogenated, cooled tail gas by the Stretford process which uses a sodium carbonate solution which reacts with H2S to form sodium hydrosulfide. This is oxidized to sulfur by sodium vanadate, and the vanadium is oxidized back to the pentavalent state by blowing with air, with sodium anthraquinone disulfonate working as an oxidation catalyst.

18639 APTIC NO. 37309

Benner, Don W.

REMOVING 99.9999% OF OIL AEROSOLS FROM COMPRESSED AIR AND OTHER GASES. *J. Am. Oil Chemists Soc., 49(1):6A, Jan. 1972. 1 ref.*

The best method found to date for removing the oil and water contaminants from compressed air is a combination of direct impaction, inertial compaction, diffusion (Brownian motion), and coalescence. Baffles, centrifugal flow, and flow directional changes of the air stream are helpful in causing coalescence and impingement. Flowing the air through porous media also is effective. The best way to coalesce liquid particulates from compressed air is to control the air flow and velocity as it passes through a fibrous bed that has predetermined porosity and which has minute strands and permanent electrostatic charges. An element designed with a prefilter with tiny pores in a cloth like layer such as silicon-treated borosilicate enhances coalescing of the liquids. The air passageway between the random microfibers of inert strands located in the next layer through which air travels, and at right angles to the stream, is very small; the strands must also be very fine. (Author abstract modified)

18640 APTIC NO. 37036

Bergen, John von

INDUSTRIAL ODOR CONTROL. *J. Air Pollution Control Assoc., 8(2):101-111, Aug. 1958. 10 refs.*

Industrial odor control in industrial and chemical processing plants is reviewed with respect to odor surveys; common sources and constituents of noxious odors; and methods of odor control, masking, and counteraction. Methods of odor control include combustion, absorption, and adsorption. Odors may be masked by applying compounds to create a new pleasant odor sensation. Odor counteraction for stack effluents consists of introducing a counteracting odor to neutralize or decrease the original noxious odor. Methods are evaluated and operating procedures and applicability are examined.

18641 APTIC NO. 37067

Bergen, John von

LATEST METHODS YOU CAN USE FOR INDUSTRIAL ODOR CONTROL. *Chem. Eng., 64(8):239-250, Aug. 1957. 10 refs.*

Industrial odor by combustion, absorption, adsorption, odor masking, and odor counteraction are discussed. Theoretically, if complete oxidation of odors in the air can be obtained deodorization is obtained because the final products are odorless, or have a higher odor threshold than the products consumed. The use of catalysts to aid combustion is illustrated by the design of platinum alloy-activated alumina coating on porcelain rods or platinum alloy coating on nichrome wire. Where odorous vapors are soluble or emulsifiable in a liquid, with or without chemical reaction, absorption methods may be suitable. Methods used vary from the simple vertical spray towers in a single or in multiple stages, centrifugal or cyclone scrubbers, and bubble and sieve trays. Odor control by adsorption methods is limited to the use of activated carbon as adsorbent; however, activated carbon adsorbs all types of odors under almost any condition. Odor masking substances are those aromatic chemicals and their by-products derived chiefly from synthetic aromatic chemical manufacture. Masking compounds should never be used to cover up a toxic concentration of gas. Advantages include a minimum capital investment for equipment (if any), ease of application, relatively low cost compared with mechanical equipment, and immediate availability for known odor nuisances.

18642 APTIC NO. 37635

Berz, Max and Wolfgang Berz

APPARATUS FOR SEPARATING SUSPENDED SOLID PARTICLES FROM A CARRIER GAS. *(Assignee not given.) U. S. Pat. 3,594,991. 10p., July 27, 1971. 11 refs. (Appl. Nov. 20, 1968, 12 claims).*

A cyclone collector and a filter can be arranged in a series to remove coarser particles from the gas in the collector and to retain residual fine particles in the filter. However, the flow resistance of the filter and of the conduit connecting the cyclone collector with the filter interferes with operation of the collector in known devices. The high flow velocity required in a centrifugal separator for high efficiency cannot be maintained unless the effective filter surface is much greater than the cross section of the vortex in the collector. In the present arrangement, a filter 0chamber is superimposed on the container of cyclone collector and vertically divided into two compartments by a filter bed of particulate material. A gas stream carrying solid particles is admitted to the cyclone collector, stripped of a portion of the solids, and passed to the upper compartment of the filter chamber by a conduit which passes the top wall of the container, the lower filter compartment, and the filter bed. Residual solid particles are removed from the gas stream passing downward through the filter bed and then are released from the lower compartment. A rake permits the filter bed to be stirred during regeneration by a scavenging gas passed upward through the filter bed. (Author abstract modified)

18643 APTIC NO. 37612

Beukenkamp, John, Carl Kerby Stoddard, and Joseph L. Waldman

REMOVAL OF CARBONYL SULFIDE DROM INDUSTRIAL GASES. *(National Lead Co., New York) U. S. Pat. 3,596,438. 8p., Aug 3, 1971. 2 refs. (Appl. Nov. 3, 1969, 12 claims).*

A practical and economical process for removing carbonyl sulfide from the gases generated in a commercial process for producing titanium tetrachloride by chlorinating ilmenite ores is presented. The gases of titanium tertachloride, hydrochloric acid, and chlorine are first freed; the remaining gases, comprising mainly carbon monoxide, carbon dioxide, nitrogen, and COS, are sent through a substantially dry static bed of activated carbon maintained at a relatively low temperature. The COS is adsorbed on the activated carbon, which is then regenerated by passing steam or an inert gas through the bed at elevated temperatures followed by cooling. The process is cyclic, containing four towers of activated carbon used in a predetermined sequence for removing COS from chlorinator gases continuously on a plant scale. It is effective in removing COS from sour gas despite the presence of large amounts of CO2. (Author abstract modified)

18644 APTIC NO. 37260

Biberacker, Gerhard, Heinz Greulich, Klaus Hess, and Richard Stickel

PROCESS OF NITROUS FUMES FORMATION IN FLAMES AND POSSIBILITIES OF THEIR REMOVAL. *(Entstehung und Beseitigung von nitrosen Gasen in Flammen). Text in German. Verfakrenstechnik, 5(3):108-114, 1971. 10 refs.*

The formation of nitric oxide in flames occurs at temperatures above 620 deg; the higher the temperature, the higher the rate of NO formation. On cooling, the NO oxidized to nitrogen dioxide, which then forms nitrogen tetraoxide. Because the oxidation is favored by excess air, the NO concentration will approach zero in the center of a flame and reach a maximum near the periphery, where the oxygen concentration approaches that of air. As experimentally determined, lower temperatures reduce NO is burner gases by intermediate cooling of a flame, heat transfer, or extended partial combustion. At high temperatures and reducing conditions obtained by burning excess fuel gas, NO2 is reduced to NO, and this is split into its elements. This combustion is economically feasible for relatively small volumes of off-gases with high NO content.

18645 APTIC NO. 37141

Bloomfield, Bernard D.

AIR POLLUTION CONTROL INSTALLATIONS. *Am. Ind. Hyg. Assoc. Quart., 17(4):434-444, Dec. 1956.*

Most of the air pollution studies conducted in Michigan are carried out by the Division of Occupational Health to evaluate existing problems and/or obtain control equipment performance data. The expansion of a large carbon and stainless steel manufacturing plant in a severely polluted community is discussed, and the various control equipment utilized is described, including Thiessen disintegrators for fume collection, hoods, washing units, and moisture eliminators. The operations involved in the manufacture of asphalt or bituminous concrete involve a variety of dust producing sources such as rotary drying, transfer points, bucket elevating, screening, and mixing. The ventilation layout and a wet-type collection system were indicated for an asphalt plant operation. Sources of air pollution control methods are also described for superphosphate fertilizer manufacture. A unit was installed to incorporate several means of wetting ammonium chloride including perforated metal filters, high and low pressure fog spray, and fiber bed collectors.

18646 APTIC NO. 37426

Boyd, William David

DEVICE FOR REDUCING INTERNAL COMBUSTION ENGINE HYDROCARBON EMISSIONS. *(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,575,386. 4p., April 20, 1971. 3 refs. (Appl. April 25, 1969, 5 claims.)*

A device for reducing the unburned hydrocarbon emissions of an internal combustion engine is provided that effectively limits the pressure drop that may occur in the engine combustion chambers and intake manifold during deceleration of engine speed. This is accomplished by admitting a charge to the intake manifold and relieving engine vacuum. This charge is an air-fuel mixture and is itself combustible. The emission control device in no way affects engine operating characteristics or efficiency during normal engine usage as the device only becomes operative during engine deceleration from high speeds.

18647 APTIC NO. 37737

Brant, John Weber

AIR-WATER DEPOLLUTION SYSTEMS. *(Assignee not given.) U. S. Pat. 3,607,690. 13p., Sept. 21, 1971. 7 refs. (Appl. April 17, 1968, 8 claims).*

A system is described for removing particulates and gases emanating from heat or power generation and for removing solid wastes from industrial waste or sewage water. Prior particulate collection devices generally emphasized mechanical design rather than the application of physical and chemical systems. While devices to decontaminate water are somewhat more effective than the air pollution control devices, the present state of the art leaves much to be desired in the removal of dissolved or soluble inorganic and organic matter and in removing colloidal matter. The air-water pollution control system comprises a number of subsystems which precipitate particulates centripetally and magnetically from gaseous emissions, cool the emission, and mix it with cold water to form an electrolyte for subsequent electrochemical and/or oxidative use. The electrolyte source may be mixed with waste water and the resulting mixture processed in an electrochemical processing unit which produces a cleansed effluent ready for reuse. (Author abstract modified)

18648 APTIC NO. 37709

Brauer, H. and D. Mewes

LAWS GOVERNING THE FLOW AS WELL AS THE SUBSTANCE AND HEAT TRANSFER IN MULTI-STAGE TURBULENT SPRAY TOWERS. *(Gesetzmaessigkeiten fuer Stroemung sowie Stoff- und Waermeuebergang in mehrstufigen Rieselboden-Wirbelschichten). Text in German. Chem. Ing. Tech., 44(5):357-360, March 1972. 9 refs.*

Each stage of a multi-stage turbulent spray tower consists of a perforated plate above which is the turbulent layer. The holes in the perforated plate are so small that the fluid may pass through but the solid particles may not. Fluid and particles pass countercurrently through the tower. On each stage solids and fluid are mixed intensely and separated again. For calculation of the multi-stage spray tower the pressure loss, the particle concentration on each stage, the average residence time, the residence time distribution, and the particle throughput must be known. The mathematical determination of each parameter is discussed. Of all contributions to the total pressure, only the pressure loss of the fluid at the transit through the turbulent particle mass and the pressure loss across the perforated plates is of significance. Analytical expressions for the two quantities are given, as well as the other parameters mentioned above. A Fortran program has been written for the calculation of the fluid dynamic properties of multi-stage spray towers together with detailed instructions for feeding the program into a computer.

18649 APTIC NO. 37733

Brevko, Robert and John R. Mucka

AIR FILTER TESTING APPARATUS. *(Auburn Engineering, Inc., Pittsburgh, Pa.) U. S. Pat. 3,608,379. 12p., Sept. 28, 1971. 5 refs. (Appl. Nov. 14, 1968, 10 claims).*

An improvement in an air filter testing apparatus is described, in which a measured amount of dust is drawn into a test filter at a controlled rate. Dust is drawn by an aspirator through a nozzle from an annular trough rotated at a predetermined speed and supplied to air flowing into the test filter. Air from the test filter is then drawn through an absolute filter. At the end of the test, the weight of the dust on the air filter is compared to the weight of the dust on the absolute filter and measured against the known weight of dust supplied to the apparatus. Variable manual and automatic controls provide required programming and protection of the system against overload. The invention also provides an improved dust-holding and pick-up arrangement and an improved shroud or holder for the air filter being tested.

18650 APTIC NO. 37462

Brocke, Werner and Horst Schade

AIR POLLUTION BY WASTE GASES FROM THE COMBUSTION OF FUELS IN STATIONARY PLANTS OF THE FEDERAL REPUBLIC OF GERMANY. PART II. POSSIBILITIES FOR REDUCTION OF SO2 AND PARTICULATE EMISSION AS WELL AS POSSIBLE CONSEQUENCES. *(Die Luftverunreinigung durch Abgase aus der Verbrennung von Brennstoffen in stationaeren Anlagen der Bundesrepublik Deutschland. II. Teil: Moeglichkeiten zur Verminderung der SO2-und Feststoffemissionen sowie ihre Auswirkungen). Text in German. Staub, Reinhaltung Luft, 32(1):20-23, Jan. 1972. PART I. Ibid., 31(12), 1971.*

For reducing sulfur dioxide emissions, either the fuel (coal or oil) or the waste gas must be desulfurized. As far as coal desulfurization is concerned, only the mineral sulfur (pyrite) can be removed at bearable costs. Only high-quality coal with a sulfur content of about 1.07% by weight to 1.5% by weight qualifies for desulfurization after granulation to grains of 3 or 1 mm. The costs are estimated at $.000225/Kwh. Light fuel is desulfurized in the refineries by hydration. It is estimated that the sulfur content of this fuel will go down to 0.3% by weight until 1980. The costs for achieving this goal are estimated to lie between $87.50 and $1,625.00/t of removed sulfur. The sulfur content in heavy fuel oil will be reduced over the next few years to an average of 1% by weight. Various methods for flue gas desulfurization have been developed; none are in operation in West Germany yet. According to the present state of the art, a reduction of 80% of the SO2 emission seems possible at a cost of $.000625 to $.00125/Kwh. By desulfurization of fuels and waste gases, it will be possible to keep the SO2 emissions in 1980 slightly below the value of 1969 (3 million tons) at a cost of .3 billion dollars. Also, a reduction of the emission of solid matter to 230,000 tons in 1980 as compared with 800,000 tons now seems to be within reach if the cost is not prohibitive.

18651 APTIC NO. 37544

Burkat, V. S., E. Ya. Tarat, V. A. Baevshii, E. M. Voronin, and M. T. Tsurenko

PURIFICATION OF ALUMINUM-INDUSTRY GASES IN A HOLLOW HIGH-SPEED SCRUBBER. *Soviet J. Non-Ferrous Metals (English translation from Russian of: Tsvetn. Metal.), 10(9):61-63, Sept. 1969. 3 refs.*

A pilot gas purifier consisting of an electric separator and a hollow scrubber with spray nozzles was tested for its ability to remove gaseous and solid fluoride compounds from exhaust gases at an aluminum plant. The efficiency of gas purification in the scrubber was determined at gas linear velocities of 3-7 m/sec, gas inlet temperatures of 40-50 C, and spraying densities of 20 and 30 cu m/sq m/hr. Spray density had a greater influence on the degree of hydrogen fluoride entrainment than a change in gas velocity. The degree of purification remained constant within the gas-velocity range tested, but increased with an increase in spraying density. An equation is given that predicts the performance of the hollow, high-speed scrubber under various operating conditions.

18652 APTIC NO. 36948

Buss, J. R.

HOW TO CONTROL FOG FROM COOLING TOWERS. *Power, 112(1):72-73, Jan. 1968.*

Fog from cooling towers can produce real hazards such as the obstruction of vision along a roadway adjacent to a tower, obstruction of vision on operating walkways and stairways of adjacent tall structures, and formation of ice on these walkways and stairways. One way to minimize the hazards is to locate the tower downwind of the roadway, or structure, for the direction of the prevailing wind during low ambient temperature periods. Another way is to transfer the heat from the water in the cooling tower to the sensible heat of the air in the tower. This is accomplished by passing all of the water through and the air over a finned-tube coil located suitably within the tower. With such an installation, fog can be eliminated completely for all ambient air conditions below 35 F with 100% relative humidity. Captial costs of such finned-tube coils are approximately five to ten dollars per gpm of tower capacity.

18653 APTIC NO. 37636

Castine, Robert L.

POST CARBURETOR FUEL CHARGE FORMING DEVICE. *(Assignee not given.) U. S. Pat. 3,596,887. 6p., Aug. 3, 1971. 7 refs. (Appl. Aug. 1, 1968, 9 claims).*

Previous devices for increasing fuel combustion efficiency in internal combustion engines have been in the form of heaters mounted on or in the intake manifold of the engine. These devices were not capable of completely eliminating raw fuel feed to the engine. A new fuel charge-forming device for mounting between the carburetor and intake manifold has extended heat exchange surfaces for heating the fuel-air mixture from the carburetor before it reaches the intake manifold. These surfaces prevent dripping of raw fuel into the intake manifold. Free heated air is also supplied to the fuel-air mixture, the amount increases with the fuel-air feed from the carburetor and when intake manifold pressure is reduced. The device not only increases engine efficiency but also eliminates unburned hydrocarbons from engine exhaust and substantially reduces carbon monoxide discharge.

18654 APTIC NO. 37765

Chase, Sidney

CATALYTIC EXHAUST GAS PURIFYING DEVICE AND CASING MEANS THEREFOR. *(Assignee not given.) U. S. Pat. 3,598,540. 4p., Aug. 10, 1971. 10 refs. (Appl. April 2, 1969, 5 claims).*

A catalytic exhaust purifying device and casing to reduce exhaust gases from internal combustion engines, with particular application to material handling equipment, e.g., forklift trucks and transporters, within buildings, plants, and warehouses, are presented. Conventional and prior proposed devices have usually included cylindrical shells with relatively long pipes and fittings with exposed parts of the shell extending beyond the chassis, thus creating a safety hazard. Prior mountings often included connecting pipes with bends and restrictions which also caused undue loss of heat and a reduced flow rate of exhaust gas. The casing of the catalytic device includes a novel construction for facilitating the mounting of means for containing catalytic pellets and simultaneously facilitating external mounting on a chassis in limited space requirements. The gas purifying device uses a bed of catalytic material and a venturi means constructed and arranged to provide decreased warm-up time for starting operation of the device.

18655 APTIC NO. 37089

Chew, Marian F.

AUTO SMOG INSPECTION AT IDLE ONLY, PART II: OXIDES OF NITROGEN. *Preprint, Society of Automotive Engineers, Inc., New York, 23p., 1971. 10 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710071.)*

Maintenance programs indicate that exhaust emission-controlled cars with hydrocarbon emissions above 400 ppm or carbon monoxide above 2.25% will have emissions reduced by proper maintenance. Distribution curves of recent surveillance data show that one-third of the 1966-69 cars have emissions above these assured reduction levels. Calculations show that maintenance based on reducing high emitters of hydrocarbons and CO should reduce total hydrocarbons by 19%, CO by 30%, but increase nitrogen oxides by 9%. Further calculations show that maintenance based on reducing high emitters of hydrocarbons, CO, and nitrogen oxides should reduce total hydrocarbons by 20%, CO by 25%, and nitrogen oxides by 6%. The inclusion of nitrogen oxide-testing along with hydrocarbons and CO in the idle inspection test method is nearly as effective in identifying high emitters of hydrocarbons, CO, and nitrogen oxides as the longer seven-mode test method. (Author abstract modified)

18656 APTIC NO. 36995

Closuit, M.

FOREST AND PUBLIC HEALTH. *(Foret et Sante publique). Text in French. Schweiz. Z. Forstwesen, vol. 117:809-817, 1966. 23 refs. (Presented at the Annual Meeting of Swiss Foresters, Sion, Switzerland, Sept. 8-10, 1966.)*

The ambient air is contaminated with particles originated by incomplete combustion processes from furnaces, thermoelectric power plants, domestic heating, automotive transport, road asphalt, and various industries. Forests constitute one of the main natural air purifying means. The extended woody surfaces have an undeniable air filtrating power which appears more visible at their borders where particle sedimentation is more intense. Forests constitute an important factor in determining the microclimatic conditions of a given region through meteorological implications. Reference is made to their radioactive fall-out capturing role. Forests constitute a biological screen for noise and various noxious agents and provide humanity with clean air and pleasant retreat corners.

18657 APTIC NO. 37764

Cover, A. E., W. C. Schreiner, and G. T. Skaperdas

THE KELLOGG COAL GASIFICATION PROCESS. *Am. Chem., Soc., Div. Fuel Chem., Preprints, 15(3):1-11, Sept. 1971. (Presented at the American Chemical Society National Meeting, 162nd, Washington, D. C., Sept. 13-17, 1971.)*

The process chemistry, materials testing, operating procedures, and economics of the Kellogg Molten Salt Coal Gasification Process are reviewed. The molten sodium carbonate system used for heat supply and catalysis in the gasification process provides several advantages. The strong catalytic action for the steam-carbon reaction and coal combustion reaction makes it possible to carry the overall gasification to essentially complete conversion of coal, leaving very little fuel to be rejected with the ash. Heat can be supplied by air or oxygen combustion of coal or char from the molten salt, and, in the case of oxygen, it is possible to keep the combustion products separated from the synthesis gas, thus keeping sulfur oxides out of the flue gas stream and eliminating carbon oxide dilution of the synthesis gas stream. Investment and gas selling costs are tabulated.

18658 *APTIC NO. 37460*

Cozzi, G.

AIR POLLUTION FROM INTERNAL COMBUSTION ENGINES: NITROGEN OXIDES. (Inquinamento atmosferico da motori a combustione interna: ossidi di azoto). Text in Italian. Riv. Combust. (Milan), 25(11):513-519, Nov. 1971. 34 refs.

The polluting action of internal combustion engine exhaust gases (photochemical smog), the mechanism of formation, the decomposition and of oxidation of nitric oxide, the formation of nitric oxide in internal combustion engines, and methods designed to reduce or eliminate nitrogen oxide emission are reviewed. The most efficient and economical way of reducing NOx emission is the modification of conditions of combustion including a reduction of combustion temperature and of the time of exposure of the gases to that temperature, and an optimization of the fuel-air ratio. Secondary treatment of combustion gases can be used if a further reduction of the emission level is desired. The value of any anti-pollution method cannot be judged only by the degree of reduction of the concentration of the noxious substances emitted but also by the degree of reduction of engine efficiency and by the effect of the method on the emission of other pollutants. A fuel-air mixture rich in fuel reduces NOx emission either by a reduced availability of atomic and molecular oxygen or by a reduction of the combustion temperature; however, rich fuel mixes generate considerably larger quantities of carbon monoxide and hydrocarbons. This method cannot be applied to diesels because of the quantity of smoke it generates. A reduction of the ignition advance reduces combustion temperature and NOx hydrocarbon formation because gases are discharged at a higher temperature and hydrocarbons are burning up outside the cylinder. An analogous method applicable to diesels is a modification of the injection timing. Recirculation of 12.5% combustion gases have reduced NOx emissions by 60% without affecting CO or hydrocarbon emissions or engine efficiency. An injection of 1.25 part water for each part of fuel diminishes NOx emission by 90% but also results in a marked reduction of engine efficiency.

18659 APTIC NO. 37073

Cromwell, W. E.

OZONE IN AIR POLLUTION ABATEMENT. *Ind. Eng. Chem., 51(6):83A-84A, June 1959.*

While the chemical mechanism by which ozone combats air pollution is not fully understood, the reaction in most cases appears to be a neutralization of odor formers. Several case histories and the ozone generation equipment utilized are given, describing the use of ozone to treat effluent gases from two New York City sewage treatment plants, to counteract odors from fish processing stack gases, to treat unpleasant kitchen odors, and, experimentally, to treat the effluent stack gases from the sulfate recovery system of a paper pulping mill.

18660 APTIC NO. 37302

Crosby, Howard M., Herman Z. Fordham, and John H. Henderson, Jr.

CATALYTIC EXHAUST PURIFIER. *(Kleen Air Corp., Marietta, Ga.) U. S. Pat. 3,598,543. 4p., Aug. 10, 1971. 5 refs. (Appl. June 25, 1969, 1 claim).*

A simple and economical catalytic purifier unit for connection directly into the exhaust pipe of a vehicle is presented. The catalytic converter consists of a casing with a compact mass of high density, low surface area alumina spheres previously impregnated with a catalytic agent, e.g., a platinum salt or a mixture of cobalt and calcium salts. An adjustable foraminous baffle is provided so that the alumina spheres may be pressed into a contacting relation in a catalytic chamber where exhaust is purified as it flows through. The high density alumina is used not only as a support for the catalyst but also as a storage bank for heat to allow the catalyst to reactivate quickly after a period of non-use. (Author abstract modified)

18661 APTIC NO. 37102

Czerwonka, L. J., R. J. Boylan, and D. J. Gonzalez

ACCELERATED TEST METHOD FOR DETERMINATION OF ODOR CONTROL DEVICES. *Ann. N. Y. Acad. Sci., 116(2):613-620, 1964. 12 refs.*

Carbon bed performance was evaluated using a gas chromatograph with an electron capture detector. Three filter beds were tested at various carbon tetrachloride concentrations from 40-4000 ppm and at various velocities; chromatograms were obtained by continuously monitoring the effluent gas stream. The results show that odor or vapor control beds or systems can be evaluated economically with a high degree of accuracy and reliability for a given set of parameters (bed thickness, vapor concentration, type and size carbons, velocity, type of vapor, and at various temperatures and pressures) for separate or combined mixtures of organic vapors by gas chromatograph methods. The chromatograms for the continuous monitoring of CC14 show instantaneous breakthrough points probably not detectable by cumulative chemical methods. Calibration of halogen leak detectors by a gas chromatograph offers a means of field evaluation of remaining filter life.

18662 APTIC NO. 37682

Davis, John C.

SO2 ABSORBED FROM TAIL GAS WITH SODIUM SULFITE. *Chem. Eng., 78(27):43-45, Nov. 29, 1971.*

A commercial process for sulfur dioxide control from stack gases was adapted to a sulfuric acid facility and an oil-fired steam generator. The process is a sodium-based sulfite absorption route. Heat requirements are substantially less than with other sulfite absorption processes because of an evaporator/crystallizer ahead of the sulfite regeneration step which increases the partial pressure of SO2 in the absorbent solution for easier volatilization. The unit is constructed of various stainless steels to prevent corrosion. In the process, two principle reactions occur involving sodium sulfite absorbent and SO2. In the absorber, both compounds combine to form sodium bisulfite. With the application of heat in the thermal regeneration section, the reaction is reversed to evolve vapor phase SO2 and water. The process is adaptable to high-particulate gas streams by modifying the design to include a separate prescrubber.

18663 APTIC NO. 37030

Davis, R. F. and M. A. Elliott

THE REMOVAL OF ALDEHYDES FROM DIESEL EXHAUST GAS. *Trans. ASME (Am. Soc. Mech. Engrs.), vol. 70:745-750, Aug. 1948. 15 refs. (Presented at the American Society of Mechanical Engineers, Annual Meeting, Atlantic City, N. J., Dec. 1-5, 1947. Paper 47-A-108.)*

The relationship between the aldehyde content of diesel exhaust gas and its irritating and odorous properties, and the effectiveness of different scrubbing media for removing aldehydes from the exhaust gas were studied. The threshold concentration for perception of odor is approximately 0.2-0.3 ppm aldehydes; the threshold of nasal and eye irritation occurs at about 1 ppm. Full-scale tests on the removal of aldehydes by scrubbing with water determined that the percentage removal of aldehydes decreases as the concentration of aldehydes in the scrubbing solution increases. At elevated temperatures the removal is nil; under no conditions was removal complete. Tests with an aqueous scrubbing solution of 10% sodium sulfite and 0.5% hydroquinone removed substantially all aldehydes for seven hours and 90% or more aldehydes for 15 hours. Estimated costs and applicability are discussed. (Author abstract modified)

18664 APTIC NO. 37267

DeBerry, David W. and Karl J. Sladek

RATES OF REACTION OF SO2 WITH METAL OXIDES. *Can. J. Chem. Eng., 49(6):781-785, Dec. 1971. 13 refs.*

Rates of sorption of sulfur dioxide from synthetic flue gas by 14 metal oxides was determined. These oxides had been selected for their potential applicability to processes for removing SO2 from flue gas using thermal regeneration of sorbent. Measurements were performed using thermogravimetric analysis, and rates were fitted to semi-empirical expressions; ceric oxide cobaltic oxide, chromic oxide, copper oxide, ferric oxide, and nickel oxide displayed measurable rates in the range 200-500 C, and were converted to sulfates. Rates were unmeasurably small at 25 to 800 C for aluminum oxide, antimony pentoxide, stannic oxide, titanium dioxide, vanadium pentoxide, tungstic oxide, zinc oxide, and zirconium oxide; copper oxide, and ceric oxide showed the highest rates. (Author abstract)

18665 APTIC NO. 37347

Deschamps, Andre and Philippe Renault

PROCESS FOR CONVERTING HYDROGEN SULFIDE AND SULFUR DIOXIDE TO ELEMENTAL SULFUR. *(Inst. Francais du Petrole des Carburants et Lubrifiants, Rueil (France)) U. S. Pat. 3,598,529, 4p., Aug. 10, 1971. 7 refs. (Appl. Feb. 19, 1969, 25 claims)*

A process for the conversion of hydrogen sulfide and sulfur dioxide to elemental sulfur, with particular application of gases from Claus ovens, is presented. The compounds to be used are remarkably stable even at temperatures higher than the melting point of sulfur, enabling the process to be used within a broad temperature range (e.g., 20-160 C) with the highest advantages obtained at the higher temperatures at which conventional processes are unsatisfactory. The hydrogen sulfide is reacted with sulfur dioxide to form elemental sulfur in the presence of a solvent containing an alkali or alkaline earth metal salt and at least one member from the group consisting of organic monocarboxylic acids, polycarboxylic acids, or their partial esters.

18666 APTIC NO. 37439

Diehl, Charles C.

TREATING POLLUTED GASES IN BAFFLE CHAMBER. *(Assignee not given.) U. S. Pat. [illegible] 5p., July 27, 1971. 4 refs. (Appl. [illegible])*

An apparatus is described for the decontamination and deodorization of gases such as those from sewage systems, slaughterhouses, and rendering plants. This is accomplished by subjecting the odorous compound to an oxidizing agent and creating a better molecular contact between the oxidizing agent and the polluted gases. A baffle chamber constructed in multiple compartments is provided, in which the contaminated gases first enter the lower region of a mixing compartment and are subjected to an oxidizing spray. Then, they rise and proceed in tortuous paths through the chamber until the entrained particles drop out. Prior known scrubbers do not involve any chemical action such as oxidation [illegible].

18667 APTIC NO. [illegible]

Dirkse, R. J. A.

AIR POLLUTION AND ITS ABATEMENT. *(Luchtverontreinigingen en de bestrijding ervan.) Text in Dutch. Chem. Tech. (Amsterdam), 26(24):[illegible], 1971. [illegible] refs.*

The materials responsible for air pollution and methods of removing them from the atmosphere are discussed. Liquid and solid pollutants are frequently removed from the air by mechanical means, which include the general processes of gravity separation, separation by adhesion, assisted by agglomeration, and electrostatic separation. Apparatus suitable for utilizing each of these methods is described, along with the major areas of applicability and the disadvantages. The major methods of rendering gaseous impurities harmless are absorption in water, binding in aqueous solutions, adsorption on solids, and chemical reaction. Chemical reaction may consist of combustion under various conditions, biochemical modification, ozonization, and ultraviolet irradiation. Finally, there are two less desirable methods available for alleviating the unpleasant effects of air pollution: dilution and masking. If none of these methods alone can cope with the air pollution problem, a combination may be required. Although contaminants are most readily and economically removed from air when present in concentrated, homogeneous form, the existence of several pollution sources, as in an industrial operation, may necessitate the installation of centralized air treatment facilities.

18668 APTIC NO. 37324

Dobrayakov, G. G., M. Z. Serebryakov, and V. P. Rychkov

OPERATION OF A GAS-CLEANING SYSTEM ON A CLOSED-TOP ELECTRIC FURNACE. *Steel (USSR) (English translation from Russian of: Stal), 1(5):401-402, May 1971.*

A ferroalloy work was provided with closed-top electric furnaces for making 45% ferrosilicon, which were successfully fitted with wet gas cleaners consisting of an inclined connecting duct, a scrubber, an atomizing pipe, and a blower. The gas to be cleaned arrives at the rate of 1700-2200 cu m/hr, the dust loading on leaving the furnace is 10-55 g/cu m. With better spraying of the inclined gas duct, the scrubber can be eliminated. (Author abstract modified)

18669 APTIC NO. 37547

Doornum, G. A. W. van, A. C. Bonapace, and H. T. Sorgnit

SMOKELESS COMBUSTION OF BITUMINOUS COAL IN DOMESTIC APPLIANCES. PART TWO. *Coal Gold and Base Minerals of S. Africa, 19(11):35, 37, 39, 41, 43-44, Jan. 1972.*

The incorporation of a magazine for fuel in an appliance, whether it be a space heater or a cooking stove has merits, since frequent replenishment of the fire and other chores can thus be minimized. The possibilities of such a combustion chamber for burning South African coal smokelessly were investigated. In all the experiments, solid fuel, ranging from bituminous coal to metallurgical coke, of a size grading of 9 by 12 mm was charged to the combustion chamber to a level of 130 mm above the air inlet flame outlet slit line. Provision was made to measure temperatures and gas composition. To establish the fire and to heat the flue and stack sufficiently to provide a reasonable draught, air was initially allowed to enter the combustion chamber from beneath the grate and through the air inlet slit. Behavior of the fire-front and flame was observed during down-draught, up-draught, and cross- draught conditions. The general combustion pattern is explained, and operational experience is outlined.

18670 APTIC NO. 37616

Dyla, John F.

ELECTRO-PRECIPITATION. *(Lodge-Cottrell Ltd., Birmingham (England)) U. S. Pat. 3,606,734 6p., Sept. 21, 1971. 10 refs. (Appl. April 17, 1969, 11 claims).*

An improved electro-precipitator electrode support structure is provided. It comprises a first framework adapted to support the upper end portions of the electrodes and a second framework adapted to support the lower end portions of the electrodes. The first framework is secured to the second by a brace to minimize the relative movement of the frameworks transversely to the bracing. The bracing comprises a plurality of straight elongated members secured to the frameworks and a plurality of annular members extended transversely to the straight elongated members. The straight elongated members are secured to the annular members around the periphery of each annular member and adjacent annular members are interconnected by cross bracing. Careful design of the electrode support structures is important since problems may arise due to the swinging movement of the discharge electrodes; this may lead to burning and breakage of discharge electrodes and poor discharge characteristics.

18671 APTIC NO. 37523

Eisfeld, Fritz

PROBLEM OF SMOKE AND GAS EMISSIONS FROM TURBINE POWER PLANTS. *(Probleme des Rauchens und der Abgasemission von Turbinentriebwerken.) Text in German. Deut. Forschungs Versuchsanst. Luft Raumfahrt, DFVLR-Nachr., no. 5:177-180, Aug. 1971.*

Aircraft emissions, now 1% of the total emissions caused by vehicles, will increase as a result of intensifying air traffic. Aircraft soot and carbon monoxide emissions correspond to 25% and 0.39% of the respective emissions by automobiles. Soot emissions by turbine engines increase with temperature, pressure, and compression. Soot is primarily formed in the primary zone close to the nozzle with low oxygen concentration. Additional air should be admitted into this zone to reduce soot emission. A total drop of 75% in emissions was reached with a rise of 40% in the amount of nitrogen oxides. Other measures to cut soot emissions by turbine engines are: the use of JP4 type fuel, additives, fuel admission by means of compressed air, or fuel admission in the form of film on the chamber wall, which is then evaporated. The 3,4-benzopyrene content of aircraft turbine emissions is negligible.

18672 APTIC NO. 36987

Elenkov, D., Chr. Boyadjiev, and R. Chinarski

ON THE PROBLEM OF THE REMOVAL OF SULPHUR DIOXIDE IN LOW CONCENTRATIONS FROM INDUSTRIAL GASES. *(Kum vuprosa za ochistvaneto na promishlenite gazove, sudurzhaschchi seren dvuokis v niski kontsentratsii). Text in Bulgarian. Izv. Otd. Khim. Nauki Bulg. Akad. Nauk. (Sofia), 2(2):367-372, 1969. 6 refs.*

Hydraulic resistance and the course of sulfur dioxide absorption from air (containing 0.17 and 0.45% SO_2 by volume), by means of ammonium sulfite-bisulfite solutions, was investigated using a venturi scrubber with a throat diameter of 3 mm. Mass transfer coefficients and results of hydrodynamic experiments are given. The method of a successful means of absorbing low concentrations of SO_2 from gas mixtures.

18673 APTIC NO. 37662

Ewing, Robert C.

HYDRODESULFURIZER INCREASES REFORMER YIELD. *Oil Gas J., 70(6):78-79, Feb. 7, 1972.*

Philips Petroleum Co. has recently placed a 26,000-b/d hydrodesulfurizer on stream at its Sweeney, Texas, refinery. The new unit removes sulfur and other impurities from a light-naphtha stream to provide a high yield reformer charge stock. Perhaps the most novel feature of the new hydrodesulfurizer unit is that it receives its hydrogen from a gas stream supplied by the plant's ethylene units. This stream contains 87% hydrogen and 12.4% methane, the balance being carbon dioxide and trace amounts of sulfur. This gas stream is cleaned by passing it through two methanator reactor beds. The first bed contacted is zinc oxide, which removes sulfur so that it does not contaminate the second bed of nickel oxide. Cobalt molybdenum is the catalyst used in a fixed-bed reactor. Operation of the hydrodesulfurization process is described.

18674 APTIC NO. 37763

Farnsworth, J. F. and R. A. Glenn

STATUS AND DESIGN CHARACTERISTICS OF THE BCR/OCR BI-GAS PLANT. *Am. Chem. Soc., Div. Fuel Chem., Preprints, 15(3):12-31, 1971. 6 refs. (Presented at the American Chemical society National Meeting, 162nd, Washington, D. C., Sept. 13-17, 1971.)*

The design characteristics of a fully integrated coal-to-pipeline gas pilot plant based on a 5 ton/hr two-stage super-pressure entrained oxygen-blown gasifier are examined. The basic principles of the process, advantages of two-stage gasification, coal beneficiation, storage, handling, coal feeding, coal gasification, waste heat recovery, char recycle system, carbon monoxide shift, acid gas removal, and methanation are reviewed for the pilot plant. Control equipment includes a multi-cyclone unit for separating the char from the gas, filters, the Purisol process and a Claus unit for recovery of elemental sulfur, absorbers for stripping hydrogen sulfide and carbon dioxide, and fixed bed catalytic reactors for the conversion of carbon monoxide and hydrogen to methane. Gas stream concentrations and material balance are tabulated.

18675 APTIC NO. 37150

Faust, W. J. and M. J. Sterba

MINIMIZING EXHAUST EMISSIONS - A REALISTIC APPROACH. *Am. Soc. Testing Mater. Spec. Tech. Publ., no. 487:36-53, 1971. 13 refs.*

Piston engines will be the dominant vehicular power plant for the next 20 years. Although modifications to engine design and operating conditions will reduce exhaust emissions substantially, catalytic exhaust gas converters will be required to reach the extreme low levels of emission desired. Lead-free gasoline will be required to permit the catalyst to function properly for the desired mileage. The initial drop in gasoline octane number, due to omission of lead, will be recovered gradually by refinery process changes. Gasoline will become more aromatic, more isoparaffinic, and less olefinic, while being reduced in sulfur content. The total content of polynuclear aromatics in the exhaust gas is shown to be not affected by a substantial increase in thy aromatic content of the gasoline. Polynuclear aromatics in the exhaust are oxidized almost completely by catalytic converters. Governmental actions, statements by the automotive industry, and statements by the petroleum industry are cited. (Author abstract)

18676 APTIC NO. 37629

Finsterwalder, Gerhard

DEUTZ CONVERTS AIRCOOLED DIESEL TO MULTIFUEL OPERATION BY ADDING HIGH-TENSION IGNITION SYSTEM. *Automotive Eng., 79(12):28-32, Dec. 1971. 1 ref. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972.)*

The Deutz multifuel engine was developed from a well-proven, mass produced, air cooled diesel engine--the FL 413 series--by the addition of a high-tension ignition system and the reworking of standard parts. The ignition system has a special spark plug located near the injector, which ignites the fuel immediately upon entry into the combustion chamber and after overcoming the ignition lag, thus permitting a uniform injection timing for all fuels. The nearer the plug is to the injector, the less it has to project into the combustion chamber to reach the ignitable mixture. A remarkably smooth combustion process occurs over the entire load and speed ranges, with little cyclic variation in the pressure diagram. The plug tip has a central electrode and a ground electrode. In addition to its electrical function, the ground electrode also ensures the best possible access of the fixture to the spark gap--by means of the two 90 deg windows. The ground electrode also acts as flame holder and permits efficient electrode gaps of 0.15-0.70 mm. The formation of black smoke and soot is reduced if the fuel is injected before the beginning of combustion, thus preventing the liquid fuel from coming into contact with the flames.

18677 APTIC NO. 37602

Fischer, Herbert

RECOVERY OF SULFUR FROM WASTE GASES. *(Rueckgewinnung von Schwefel aus Abgasen). Text in German. Umwelt (Duesseldorf), 2(1):47-48, Feb./March 1972. 8 refs.*

Waste gases with high volumetric hydrogen sulfide concentrations between 20 and 100% are produced in refining sulfur-containing raw material. These waste gases also contain carbonyl sulfide and other organic sulfur compounds in low concentrations. For recovering sulfur from such waste gases, the Claus method in various forms is suitable. Over the past few years, Claus plants for recovering elemental sulfur from refinery waste gases and from the preparation of natural gas have been built. Depending on the H2S concentration, 95 to 98% of the sulfur are recovered. The Federal Republic of Germany has set the maximum allowable emission concentration for H2S at 0.15 mg/cu m and for SO2 at 0.4 mg/cu m. The waste gases leaving a Claus plant still contain traces of H2S and SO2 which must be emitted by high stacks so that the above limit concentrations are not exceeded. The desulfurization efficiency can be raised to 99% by the additional use of special catalysts. If this is still not enough to comply with the legal limit concentrations, adsorptive methods such as the Reinluft, Sulfren, and Sulfacid processes are available. The Claus plant for desulfurization of waste gases with volumetric concentrations of more than 20% H2S operates with a profit or at least covers the costs of the plant, since sulfur achieves a price of $20.00 to $25.00/t.

18678 APTIC NO. 37619

Forster, E. J. and L. E. Stinson

CARS NEED MORE OCTANE WITHOUT LEAD. *Hydrocarbon Process., 49(12):97-99, Dec. 1970. 2 refs.*

The octane number requirements of 29 unleaded-fuel cars using unleaded reference fuels were compared with the requirements of 29 leaded-fuel cars using leaded reference fuels. The cars included 23 1965 model cars and six 1968 model cars, each tested for an average of 56,000 miles. The octane requirement was surprisingly higher for all cars run on unleaded fuels, i.e., 4.6 RON higher for cars run on premium lead-free gasolines and 6.3 RON higher for cars run on regular lead-free gasolines. The higher requirement of unleaded cars was influenced to a large extent by greater deposit accumulation in the combustion chambers. The results indicate that new cars may have to be designed with lower octane requirements or that unleaded-fuel quality must be higher than 91 RON.

18679 APTIC NO. 37680

Friedrich, Henry E.

EQUIPMENT FOR AIR POLLUTION ABATEMENT. *Preprint, Society of Manufacturing Engineers, Dearborn, Mich., 19p., 1970. 5 refs. (Presented at the Economics of Environmental Pollution Abatement, Creative Manufacturing Seminar, Detroit, Mich., Dec. 1-2, 1970, Paper MM70-605.)*

The cost and effectiveness of air pollution control installations are closely related to efficiency capabilities, capacity, and control equipment selected. The factors which affect selection of equipment and important characteristics of control units are examined. The inertial or mechanical types of equipment include settling chambers, baffles, cyclone collectors (centrifugal separators), impingers, and dynamic collectors. A second category consists of air washers, impingement scrubbers, submerged nozzles, dynamic scrubbers, spray towers, packed towers, and venturi scrubbers. Fabric filters and electrostatic precipitators are also described. Gaseous emission control equipment comprises gas absorbers, gas adsorbers, thermal and catalytic oxidizers, and direct combustion units. Operational limitations, comparative efficiencies, and costs are considered.

18680 APTIC NO. 37304

Gallen, Thomas J.

APPARATUS FOR FILTERING POLLUTANTS. *(Assignee not given.) U. S. Pat. 3,599,399. 7p., Aug. 17, 1971. 13 refs. (Appl. March 8, 1968, 3 claims).*

An apparatus for filtering pollutants, specifically paint and powder particles, from an airstream during a paint and powder- spraying operation is presented. In conventional practice, paint particles are extracted by passing through paper, glass, or water media. The filtering apparatus removes the particles prior to reaching the conventional filters, thereby increasing their life and efficiency. The apparatus is compact, portable, easily cleaned, and can be adapted for use in conventional or electrostatic spray booths. The apparatus comprises a plurality of filter banks is series arrangement between the workpiece being spray painted and the conventional filter. The filter banks are alternately grounded and charged. (Author summary modified)

18681 APTIC NO. 37742

Germerdonk, Rolf

EXPERIMENTS CONCERNING THE THERMAL DECOMPOSITION OF NITROSE AND AMINE-CONTAINING WASTE AIR. *(Versuche zum thermischen Zersetzen von nitrose-und amin-haltiger Abluft). Text in German. Chem. Ing. Tech., 44(5):332-337, March 1972. 19 refs. (Presented at the Fahrestreffen der Verfahrens-Ingenieure, Nuremberg, West Germany, Sept. 21-23, 1971.)*

The degree of dissociation of nitrogen oxides in waste air through thermal processes is primarily determined by the reaction speeds and, to a lesser extent, by the reaction equilibria. The reaction NO plus CO yields CO2 plus 1/2N2 in high flame temperatures contributes to the dissociation of the nitric oxide. Experimental burners were designed for a nitrose and amine-laden waste air flow and for a waste gas containing up to 90% NO. In the first case, the waste air flows into the combustion chamber as primary air; the burner design permits an external gas-internal waste air flow with short mixing path. Natural gas and NO-containing waste air leave the annular slot as relatively thin jets. At a waste air throughput of 110 cu m/hr and a slot width of 4 mm, a lamda of 0.8 and the presence of about 60 g NOx/cu m, more than 99% of nitrogen oxides could be eliminated. The operating costs (Including fuel, equipment, capital and maintenance costs) for this method of waste air cleaning were estimated as 4.75/1000 cu m waste air. In the second case, a burner is used where a relatively large ingition and preheating flame is maintained by a continuous supply of fresh air. The waste gas is mixed with the natural gas and passed through the inner annular slot in a rotary movement to the burner. Through the external annular slot, air is supplied in a rotary movement. A large fuel surplus is maintained at all times. More than 88.8% of the NO is eliminated. A cost estimate indicated that the total costs are rather high. The costs for natural gas, air, and power are estimated at $.02/cu m NO (100%). The total costs may be as high as $.08 to $.38/cu m NO (100%).

18682 APTIC NO. 37450

Glowiak, Bohdan and Piotr Kabsch

METHOD FOR THE DETERMINATION OF THE WETTABILITY OF DUSTS AND IMPORTANCE OF THE RESULTS OF TESTS FOR PRACTICAL APPLICATION. *(Verfahren zur Bestimmung der Benetzbarkeit von Staeuben und Bedeutung der Untersuchungsergebnisse fuer die Praxis). Text in German. Staub, Reinhaltung Luft, 32(1):9-11, Jan. 1972. 8 refs.*

Under conditions which are very similar to those prevailing in wet dust collectors, the wettability of dusts was studied by determining the velocity of binding of the dust with the fluid medium. The dust-laden gas impacted perpendicularly on the fluid level. Through impaction, the dust particles were brought into close contact with the fluid surface; the wetted particles sank into the fluid, the unwetted particles were prevented from settling on the surface by a flow of air brushing over the fluid surface. They were drawn off and collected in a filter. The ratio between the dust quantity retained in the liquid and the through-flow-time of the dust-laden gas as well as the impaction surface yielded the binding speed between dust and fluid. The size of the impaction surface can be determined by a photographic method. The values of the wetting speed of 17 different dusts were examined. All dusts were in the same grain size class with an average sinking speed of 16.0 cm/sec. The dust concentration in the gas flow was 10 g/cu m; the exit speed from a nozzle, 10 m/sec. Fly ash dust from soft coal, for instance, had a binding speed of 18.17 g/sq m/sec; wood dust from a spruce, 9.16 g/sq m/sec. The method was very suitable for practical application. It can be used for determining the collection efficiency of wet collectors for certain grain sizes.

18683 APTIC NO. 36971

Go, Tjong Lee

PARTICLE CAPTURE MECHANISM STUDIES BY CLOUD-TYPE ATOMIZATION IN A VENTURI SCRUBBER. *Southern Illinois Univ., Carbondale, School of Engineering and Technology, Thesis (M.S.), 1971, 79p. 12 refs.*

The mechanism of dust capture by cloud-type atomization of water in a venturi scrubber was studied using high-speed still photography of dye particles generated by a spinning-disk aerosol generator. Cloud-type atomization was employed because a previous study indicated it had lower acceleration and thus lower velocity than drop-type atomization. It was obtained using air throat velocities of 240 and 290 ft/sec and 1.6 mm inner diameter water inlet nozzles. The capture mechanism was observed in pictures taken at the throat and diffuser of the scrubber. Pictures taken at various distances downstream from the water inlet gave accelaration/deceleration data for atomized water and dust particles. Particles 10 micron and larger, with an initial velocity of 260 ft/sec, were almost instantaneously decelerated by the cloud-type atomized water droplets. Their capture was complete at 0.25 cm downstream from the water inlets, at which point their velocity equalled that of the water droplets (30 ft/sec).

18684 APTIC NO. 37674

Gobiet, Viktor

REDUCTION OF THE DUST EMISSION DURING THE PROCESS OF PRESSING THE COKE THROUGH THE COKE MASS PILOTING STATION BY A DUST COLLECTOR. *(Verminderung der Staubemission beim Druecken des Kokses durch Entstauber-Kokskuchenfuehrungswagen). Text in German. Glueckauf (Essen), 108(5):180-183, March 1972.*

The process of pressing coke through the coke mass piloting station produces dust in the opening of the coke oven door, in the exit of the coke mass from the furnace chamber, in stirring the coke in the tub of the piloting cart, and in the breaking and falling of the coke into the quenching trough. For reducing the dust emission, a mobile roofing with an exhaust fan and dust collector was installed over each coke mass piloting and quenching cart. At first the dimensions of the exhaust fan were underestimated, and it had to be enlarged. The final version was connected to two independently-operating rotary wet collectors. Examination of the newly installed dust collection system revealed that the quantity of dust-laden air being drawn off by the exhaust fan depends on the prevailing wind conditions. On the average, 90% of the emissions are drawn off. The wet collectors achieve collection efficiencies of 97.5 to 97.7%. The average wind speed at the time of the collection efficiency measurements was 10.6 m/sec; the prevailing wind direction was south to southwest.

18685 APTIC NO. 37491

Goodsel, Arthur J., M. J. D. Low, and Nobutsune Takezawa

REACTIONS OF GASEOUS POLLUTANTS WITH SOLIDS. II. INFRARED STUDY OF SORPTION OF SO2 ON MGO. *Environ. Sci. Technol., 6(3):268-273, March 1972. 28 refs.*

Sorption of sulfur dioxide on magnesium oxide at 25 C, and thermal decomposition of the sorbed layer in vacuum at temperatures up to 775 C, were studied using infrared spectra recorded with a Fourier transform spectrometer. The SO2 was sorbed in at least four forms. The main interaction of SO2 with degassed MgO resulted in the formation of monodentate and bidentate-like surface sulfites which could only be removed by degassing at high temperatures. A reversible chemisorption occurred at high degrees of surface coverage. The SO2 was then physically adsorbed on top of the more tightly bound species. Heating in vacuum at temperatures below about 300 C resulted in the removal of a large portion of the bidentate-like species, while at temperatures above 300 C the monodentate species was desorbed. Temperatures of up to 775 C were used to remove completely all of the desorbed material. Heating in oxygen converted the adsorbed material to species resembling bulk magnesium sulfate. In general, the SO2 sorption on MgO differed considerably from that on calcium oxide. (Author abstract)

18686 APTIC NO. 37222

Grantham, LeRoy F., William A. McCollum, Jr., and Dennis C. Gehri

PROCEDURE FOR THE REMOVAL OF NITROGEN OXIDES AND OTHER IMPURITIES FROM GAS MIXTURES. *(Verfahren Entfernung von Stickstoffoxyden und anderen Verunreinigungen aus Gasmischungen). Text in German. (North American Rockwell Corp., El Segundo, Calif.) W. Ger. Pat. 2,108,059. 74p., Aug. 19, 1971. (Appl. Feb. 19, 1971, 31 claims).*

Power-plant waste gases and automobile exhaust containing nitric oxide, carbon monoxide, halogens, halides, metal oxides, or fly ash were purified by bringing them into contact with alkali metal carbonates or mixtures containing lithium carbonate 45 plus or minus 5, sodium carbonate 25 plus or minus 5 mole% on a metal wire-lattice of stainless steel, nickel, or copper-nickel-iron alloys at 350-600 deg. Passage of automobile exhaust at 395 deg through a 20-liter vessel containing a stainless steel grating net with molten alkli metal carbonate resulted in removal of up to 95% of the lead in the exhaust and 15-50% of the NO. The degree of removal depended on driving speed and contact time.

18687 APTIC NO. 37525

Gromotka, Hubert

TREATMENT OF REFUSE FROM CONVENTIONAL AND NUCLEAR INDUSTRIAL PLANTS. *(Behandlung von Abfaellen aus Konventionallen und Kerntechnischen Industrieanlagen). Text in German. Energie Tech., 24(1):4-7, Jan. 1972.*

In general the most suitable removal method of industrial refuse is incineration. A chemical plant constructed on incineration plant for refuse which comprised waste on a cellulose base and plastic waste material. For the refuse on a cellulose base, a combustion grate was constructed; the plastic refuse is burned in a separate combustion chamber. Initially corrosion was noticed at the heating surfaces in the plastic combustion chamber because of the insufficient mixing of the flue gases. A modification of the combustion chamber improved the situation. The heating surfaces should be laid out as smooth-welded tube walls and the temperature of the flue gases should not exceed 750 C when getting into contact with the heating surfaces. A high combustion chamber increases the time which the flue gases remain in the chamber, and thus corrosion is hampered. The waste heat from the incinerator is used in a boiler for 25 tons of steam/hr. The waste heat boiler is used for 60,000 cu m flue gas/hr. It accommodates auxiliary barriers for liquid refuse.

18688 *APTIC NO. 37001*

Hagel, J. A.

UNA SPRAY INTEGRATED FURNACE. National Oil Fuel Inst. Inc., New York, Equipment Development Committee, Proc. New Improved Oil Burner Equip. Workshop, 1970, p. 127-156. (Sept. 23-24.)

A compact oil-fired furnace was developed to enhance the competitiveness of oil heating with other heating techniques and to accommodate future pollution emission control requirements. The furnace (the UNA Spray Integrated Furnace) has a fuel atomizer which creates a uniform fog of fuel ideally suited for combustion. Other key components are a combustion chamber whose design contributes significantly to the warm air heat transfer function; a heat exchanger capable of reducing stack temperatures to 350 F; a radial blade fan insuring stable combustion air; and an integrated replaceable burner. The efficiency of a prototype furnace was 86% at the nominal 100,000 BTUH output, a gain of 10-15% over conventional furnace operations. Emissions of carbon monoxide, nitrogen oxides, hydrocarbons, and particulates were within future anticipated limits. Cost advantages of the furnace will be substantially lower operating costs, substantially lower installed costs, reduced service cost, and lower parasitic costs. The later feature is compatible with the trend toward mobile and modular housing.

18689 APTIC NO. 37042

Hancock, E. E., R. M. Campau, and R. Connolly

CATALYTIC CONVERTER VEHICLE SYSTEM PERFORMANCE: RAPID VERSUS CUSTOMER MILEAGE. *Preprint, Society of Automotive Engineers, Inc., New York, 25p., 1971. 6 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710292.)*

Two types of catalysts were tested in a fleet of 24 1969 vehicles operated in customer-type urban driving regimes, on both leaded and nonleaded fuels over a period of one and one-half years. The two catalyst types, and the converter systems chosen for this evaluation, were selected on the basis of information obtained from an earlier test program involving four cars durability-tested on a more rapid test track mileage accumulation cycle, indicating that operation on leaded fuel would seriously affect the life of the catalyst. However, the 6000-mi. average emission objectives were met for the fleet. The 24-car fleet demonstrated that many other problems, such as catalyst attrition with resultant converter plugging, must be solved. Converter designs should incorporate optimum exhaust flow distribution through the catalyst to minimize exhaust velocity effects. Catalyst size, shape and physical integrity, and/or support play an important part in overall catalyst life. If stringent emission targets are to be met, converters must be designed for fast warm-up and be located close to the engine exhaust outlets. Secondary air is required, and the use of spark retard on warm-up is advantageous. A means of diverting the exhaust gas around the catalyst bed is necessary to prevent catalyst damage from over-temperature during some operating modes and during periods of engine malfunction. The 24-car fleet was equipped with a programmed protection system designed to protect the catalysts from such damage. The use of nonleaded fuel during road operation extends the life of catalyst emission reduction systems.

18690 APTIC NO. 37686

Hartman, Miloslav, Joseph R. Polek, and Robert W. Coughlin

REMOVAL OF SULFUR DIOXIDE FROM FLUE GAS BY SORPTION AND CATALYTIC REACTION ON CARBON. *Chem. Eng. Progr. Symp. Ser., 67(115):7-22, 1971. 56 refs.*

The sorptive and catalytic properties of several microcrystalline carbonaceous materials, primarily active carbon and coke, in the presence of sulfur dioxide, oxygen, and water, are reviewed from the standpoint of their use for the desulfurization of flue gas. Experimental results in the literature that illustrate the interactions of the sorbents with flue gas over a wide range of temperatures and as a function of other variables are discussed. New experimental results that describe the simultaneous sorption of SO2 on active carbon and regeneration of the sorbent with water in a trickle-bed as well as in a stirred-tank slurry reactor are also given. Low, intermediate, and high temperature desulfurization processes are compared. Only the low temperature scheme is devoid of the severe drawbacks of catalyst decomposition and possible spontaneous ignition. Although the low temperature in itself is a disadvantage, the process has other possible advantages, e.g., removing SO2 in a fixed carbon bed column and simultaneously producing sulfuric acid or possibly ammonium sulfate in the liquid effluent. (Author abstract modified)

18691 APTIC NO. 37379

Haskett, Frank B.

CYCLIC PROCESS FOR DESULFURIZING CRUDE PETROLEUM FRACTIONS WITH SODIUM. *(Assignee not given.) U. S. Pat. 3,565,792. 4p., Feb. 23, 1971. 6 refs. (Appl. June 7, 1968, 3 claims).*

While various techniques for reducing the sulfur content of hydrocarbon fractions have been developed in the past, most of these processes have involved complicated and expensive catalytic reactions. The present process is clearly distinguished from any previous processes by providing a simple and efficient integrated process for the desulfurization of crude oils and other petroleum fractions by the utilization of metallic sodium. The sulfur content of the crude petroleum fractions is reduced below acceptable limits by reacting the crude petroleum with a dispersion of sodium metal at ambient temperatures to form a sodium sulfide precipitate eliminated from the treated crude through centrifugation. The sodium sulfide precipitate is reacted with hydrochloric acid to produce sodium chloride which, after reclamation, can be employed through electrolysis to provide the necessary sodium for desulfurization of the crude oil. (Author abstract modified)

18692 APTIC NO. 37380

Herbstman, Sheldon, Frank E. Guptill, Jr., Reese A. Peck, and Raymond F. Wilson

DESULFURIZATION WITH A CATALYTIC OXIDATION STEP. *(Texaco Inc., New York, N. Y.) U. S. Pat. 3,565,793. 5p., Feb. 23, 1971. 3 refs. (Appl. Dec. 27, 1968, 15 claims).*

Desulfurization of a hydrocarbon material such as oil, can be accomplished by contacting the sulfur-containing hydrocarbon material with an organic hydroperoxide, an organic peroxide, or an organic peracid oxidant in the presence of a metal catalyst selected from a Group IV-B metal, a Group V-B metal, or a Group VI-B metal, followed by sulfur reduction. The sulfur reduction can be by way of a base treatment process, thermal treatment, solvent refining, or hydrodesulfurization. Thus, the use of certain metal catalysts with an oxidant promotes the oxidation of sulfur in a hydrocarbon material whereby selectivity is accomplished without appreciably lowering product yield. Previous methods which utilized air oxidation of hydrocarbon materials were not selective towards sulfur oxidation, which resulted in the formation of ketones and acids, and high product losses resulted.

18693 APTIC NO. 37743

Hess, K., W. Leuckel, and E. Minx

DISPOSAL OF ORGANICALLY POLLUTED WASTE WATERS BY COMBUSTION. *(Aufarbeitung von organisch verunreinigten Abwaessern durch Verbrennungsprozesse). Text in German. Chem. Ing. Tech., 44(5):325-332, March 1972. 11 refs. (Presented at the Jahrestreffen der Verfahrens-Ingenieure, Nuremberg, West Germany, Sept. 21-23, 1971.)*

In disposing waste water by combustion, it is advantageous to have water evaporation and oxidation of organic components 0take place simultaneously with combustion of the auxiliary fuel. A waste water combustion system which fulfills this demand is described. It comprises a natural gas burner and a waste water atomizing nozzle. The system was tested with water to which fuel oil was added in various quantities for simulation of the organic pollution. A fuel to air ratio of lamda equals 1.1 was selected for the experiments. The completeness of combustion was checked by measuring the oxygen, methane, hydrogen, carbon monoxide, carbon dioxide, and nitric oxide (when the waste water contained nitric acid) concentrations at various distances from the burner end. In 3 m distance from the burner, combustion was terminated. The concentrations of CH4, H2, and CO were practically zero (i.e., less than 0.02%). Depending on the height of the nitric acid concentration of the waste water, the NOx concentrations at the end of the combustion chamber at stoichiometric or slightly oxidizing conditions were above the maximum allowable emission concentrations. Further experiments revealed that two-step combustion of nitric acid containing waste water with a lack of air on the first stage reduced the nitrose-concentration in the waste gas. The specific fuel demand increases, however.

18694 APTIC NO. 37618

Hill, William E., Milton B. Hilt, Edward P. Hopkins, and Robert H. Johnson

LOW SMOKE COMBUSTION SYSTEM. *(General Electric Co., Schenectady, N. Y.) U. S. Pat. 3,608,309. 7p., Sept. 28, 1971. 7 refs. (Appl. May 21, 1970, 4 claims).*

A combustion system for a gas turbine which produces a smokeless exhaust stack is constructed such that the combustion reaction zone will operate with a lean fuel-air mixture. The lean combustion zone is stabilized by a vortex generated around the centerline of the liner, creating gas flow patterns that cause strong back flow in the combustion reaction zone. This vortical flow also sweeps out the fuel-rich pockets, thus facilitating complete combustion. A thermal soaking region with no air holes in the liner is provided downstream of the last row of combustion air holes, wherein the soot which may be formed in the combustion process is consumed by a very fast chemical reaction. The temperature throughout the soaking region is maintained sufficiently high to induce such a reaction. Axially downstream of this region, air is added to the combustion products so that they are cooled to enter the first stage nozzle at the desired temperature. Previous attempts to reduce smoke were too complex, cumbersome, or expensive, such as fuel additives or scrubbers. (Author abstract modified)

18695 APTIC NO. 37704

Hirao, Osamu and Tsutomu Kato

APPARATUS FOR REMOVING CARBON MONOXIDE FROM ROOM AIR AND EXHAUST GAS. *(Kachita Co., Ltd., Hamanatsu-shi (Japan)) U. S. Pat. 3,607,133. 5p., Sept. 21, 1971. 5 refs. (Appl. Oct. 20, 1969, 10 claims).*

A method is provided for removing carbon monoxide continuously and efficiently from room air or automobile exhaust using an oxidizing catalyst containing a desiccative substance such as natural zeolite, active silica, or active alumina. The apparatus comprises a casing having a gas inlet and outlet on its lid section, and a slowly rotable catalyst containing vessel of flat cylindrical shape closely disposed on the inner periphery of the casing. The air or gas to be purified passes over the catalyst twice, in opposite directions. Thus, this method is able to handle the moisture generated by fuel combustion which previously deactivated catalysts. (Author abstract modified)

18696 APTIC NO. 37374

Hirschler, Daniel A., Jr. and Denis L. Lenane

PARTICULATE TRAP. *(Ethyl Corp., New York.) U. S. Pat. 3,564,843. 4p., Feb. 23, 1971. 4 refs. (Appl. Feb. 27, 1969, 13 claims).*

Although cyclone traps or inertial separators function quite well under steady state condtions, they leave much to be desired when they are used to remove dust or other particulates from a pulsating gas stream. One reason for this is that the pulsating gas tends to re-entrain the particulates in the collection chamber and exhaust them to the atmosphere. A cyclone particulate separator is described which has a mesh-lined collection chamber such that the mesh defines a hollow cylindrical core having the same diameter as the reject hole. A perforated liner can be placed in the core. This arrangement prevents the re-entrainment of particulates removed from a pulsating gas stream such as the exhaust stream from an internal combustion engine. (Author abstract modified)

18697 APTIC NO. 37729

Hodapp, Emil

ELECTRICAL PRECIPITATORS FOR GAS CLEANING IN FERROALLOY FURNACES. *(Erfahrungen ueber Elektro-Filteranlagen an Ferro-Legierungs-Oefen). Text in German. Luftverunreinigung, no. 12:21-25, Dec. 1970.*

Ferroalloy furnaces produce enormously large quantities of waste gases whose dusts are rich in silicon dioxide. A grain size analysis showed that 92% of the dust grains are smaller than 10 micron, 76% smaller than 5 micron, and 49% smaller than 2 micron. Moreover, the dust has a high electric resistance. Experiments with dust collectors for a 24 MW furnace revealed that the best results were achieved with electrostatic precipitators preceded by a gas scrubbing tower with a diameter of 5 m and a height of 25 m. The electrostatic precipitator consists of two electrically and mechanically separated fields. The entire dust collection system for the 24 MW furnace including a scrubbing tower, blower, scaffold, insulation, and ducts cost $300,000 in 1965, which was about as much as the cost for the ferroalloy furnace itself. A dust reduction to 150 mg/cu m is not achieved with this system as it stands now. The scrubber would have to be raised to a height of 8 m, a better regulation of the gas quantity would be necessary, and the installation of an intermediate dust bunker would be required in order to arrive at this value.

18698 APTIC NO. 37623

Hoess, A.

CALCULATION OF STACK DIMENSIONS. *(Berechnung von Schornsteinabmessungen). Text in German. Oel Gasfeuerung, no. 2:114-119, Feb. 1972.*

With the advent of central heating, the stack has the main function of discharging waste gas. The necessary air for combustion (formerly supplied by stacks) is supplied by blowers. The old DIN standard for calculating the stack cross section took into consideration the different properties of the various kinds of fuels, the type of construction of the heat generators, and the stack height. The DIN standard 4705 for calculating the stack cross section which came out in 1944 used only two parameters. Thus, an updating of the old DIN standard became necessary. The new DIN standard bases the calculation on five parameters: the nominal capacity of the heat generator, the stack height, the different kinds of fuels, the different updraft requirements, and the stack construction. The method of determining the cross section is based on a comparison of the necessary updraft requirement at the stack entrance and the updraft strength of the stack at this point. An exact knowledge of the hourly waste gas weight produced by the heat generator is desirable. It is hoped that with this more scientific stack dimensioning, early damage can be avoided and more efficient discharge of waste gases can be achieved.

18699 APTIC NO. 37661

Holcombe, J. Kirby and Peter Kalika

CONTROLLING INTERIOR AIR POLLUTION. *Plant Eng., 26(4):64-65, Feb. 24, 1972.*

Interior air quality is controlled through air conditioning, heating and/or ventilating systems which condition a mixture of either interior and outside air, or 100% outside air. In this context, quality denotes temperature, humidity, and pollutant concentrations in the air. Pollutants of general concern are particulate matter, sulfur oxides, nitrogen oxides, ozone and other oxidants, hydrocarbons and other organic gases and vapors, carbon monoxide, pollen, spores, bacteria, and odorous compounds. The control of particulate matter and sulfur oxides are discussed. Air filters, electronic air cleaners, activated charcoal, scrubbers, and other air conditioning components are listed according to their effectiveness for controlling particulate matter, gases, odors, and pollutant generation.

18700 APTIC NO. 37677

Horntvedt, Einar

OPERATING EXPERIENCES AND ECONOMIC ASPECTS OF THE SCA-BILLERUD (RECOVERY) PROCESS. *(Driftserfarenheter och ekonomiska aspekter pa SCA-Billerudprocessen). Text in Swedish. Norsk Skogind. (Norway), 25(5):131-134, May 1971.*

In the SCA-Billerud chemical and heat recovery process for sodium-based SSL, diluted SSL (from washed pulp) is evaporated to 50-55% dry solids, then sprayed in finely divided droplets into a pyrolysis reactor where the atomized particles are mixed rapidly and intensely with hot stack gases. Because of the low proportion of oxygen in the flue gas, a reducing atmosphere prevails in the reactor, resulting in rapid production of combustible gas (in which most of the sulfur is in the form of hydrogen sulfide) plus a fine dust (large sodium carbonate), plus organically derived carbon. In the subsequent degassing chamber, exothermal heat is given off (which is used for steam generation) before the dust is separated from the gas phase. The major portion of the steam in the gases is condensed to increase the fuel value. The sodium carbonate is leached from the dust, and the residual carbon is recycled to the pyrolysis reactor. The gases are burned in a furnace which converts the H2S to sulfur dioxide; the latter is absorbed by the leached sodium carbonate, and the resulting cooking liquor is recycled to the digester. Thhe size of the recovery plant depends mainly on the dry solids content of the SSL. This in turn depends on mill capacity, pulp yield, chemical charge, and degree of liquor recovery. The chemical consumption varies not only between different pulping processes but also between different sulfite mills using the same process. Investment costs and profitability of recovery vary inversely with pulp yield.

18701 APTIC NO. 37675

Hota, Kenji, Yasumi Kamino, Shiro Inoue, and Toshio Hama

DESULFURIZATION OF FLUE GAS BY ACTIVATED CARBON, FIFTH REPORT. THE RELATIONSHIP BETWEEN OPERATIONAL CONDITIONS AND THE CAPACITY FLUCTUATION OF ACTIVATED CARBON. *(Suijoki datsurishiki kasseitanho haien datsuryu (daigoho), gosa joken to kasseitan no seino henka no kankei). Text in Japanese. Preprint, Japan, Chemical Society, Tokyo, p. 237, 1971. (Presented at the Fall Meeting, Japan Chemical Society, 25th, Osaka, Japan, Oct. 11-14, 1971.)*

In order to detect the causes of the deterioration of the adsorption capacity of activated carbon, treatments were given to fresh carbons under various conditions and changes in the capacity were observed. According to the results, one of the common factors was the presence of oxygen, and the smaller the oxygen quantity, the smaller the degree of deterioration. The deterioration appeared regardless the degree of sulfur dioxide adsorption capacity. For further investigation, the concentration of oxygen, the treatment temperature and time were varied in the atmosphere of nitrogen and oxygen, and the SO2 adsorption capacity fluctuation of carbon was examined. As noted in the previous experiments, the carbon with less SO2 adsorption capacity showed an increase in the amount of acidic base adsorption and a decrease in the adsorption of basic radical. It was conjectured that the deterioration of SO2 adsorption capacity was caused by the decrease of surface activity radical, or perhaps by the increase of harmful surface oxidation. The oxidation was probably caused by the oxygen in the combustion gas which remained in the pores or spaces between particles or by the oxygen in the air entering the separation tower. Oxidation of the surface of the active carbon occurred under the temperature condition (300 C) in the separation tower.

18702 APTIC NO. 37643

Huch, Reinhold

WASTE-GAS PURIFICATION IN THE FOOD INDUSTRY. *(Versuche zur technischen Reinigung von Abgasen in der Lebensmittelindustrie). Text in German. Luftverunreinigung, 1970:30-33, Dec. 1970.*

Fumes containing nitriles, fatty acids, esters, aromatics, and amines from the drying of potato pulp are treated by water washing and burning at 430-500 deg in a gas furnace. A somewhat similar treatment is applied to fumes generated by cooking potato chips in fat. The scrubber (4000 mm high and 1000 mm in diameter) was designed for a peak capacity of 14,000 cu m waste gas/hr; on the average, it is capable of treating 7000 cu m/hr. It consumes 3-6 cu m water/hr. The combustion chamber is heated with natural gas; its catalytic afterburner can accommodate three 450-mm-long honeycomb catalysts, though two suffice at the moment. The aluminum oxide carrier has an active layer of 0.1% platinum. Waste gases with 115-177 mg organically bound carbon/cu m were cleaned to a residual concentration of 0.5-10 mg/cu m with this setup. A 92-98% collection efficiency could be achieved.

18703 APTIC NO. 37603

Huenlich, Hans-Werner

HOW IMPORTANT ARE THE PROBLEMS OF ENVIRONMENTAL PROTECTION FOR THE BRICK AND EARTH ENGINEER. *(Welche Bedeutung haben Probleme des Umweltschutzes fuer Steine und Erden-Ingenieure). Text in German. Tonind. Ztg, 96(1):21-23, Jan. 1972.*

The environmental problems with which brick and earch engineers are confronted include the cleaning of waste gases and the reduction of dust emissions. The removal of sulfur dioxide closely followed by that of fluorine from the industrial waste gases have top priority. Applicable waste gas desulfurization methods seem to be available now after several setbacks. They are mostly based on the binding of the gaseous SO2 on fine-grained bases such as magnesium oxide, dolomite, caustic lime, lime hydrate or limestone present in suspended form or in the fluid-bed. No method for the removal of fluorine from the waste gases of fertilizer plants is available yet. The elimination of the fluorine emissions by aluminum plants has not been entirely solved yet either. The dust collection methods have reached a high level of achievement, so that dust elimination nowadays is mainly a problem of costs and of the disposal of the collected dust.

18704 APTIC NO. 37714

Hughes, William Graeser

METHOD FOR MANUFACTURE OF MALEIC ACID ANHYDRIDE FROM BENZOL. *(Verfahren zur Herstellung von Maleinsaeureanhydrid aus Benzol). Text in German. (Tenneco Chemicals, Inc., New York) W. Ger. Pat. 2,105,031. 19p., Aug. 19, 1971. (Appl. Feb. 3, 1971, 7 claims).*

An improved method for manufacture of maleic acid anhydride by the catalytic oxidation of benzol (benzene) in gas phase is discussed. The gaseous organic compound, together with the gas containing free oxygen, is conveyed over oxidizing catalysts which usually contain vanadium oxides as the principal component and are applied to an inert carrier, such as aluminum oxide. These catalysts are held inside a large number of small tubes mounted in a cylindrical reactor, the tubes are immersed in a liquid for heat removal. The reaction gas mixture which now contains maleic acid anhydride, some unchanged components, and some by products, is first condensated at 57 C, to separate the maleic acid anhydride. The uncondensed gas mixture is then washed with water to absorb the maleic acid anhydride to a concentration of 40%. The residual gas obtained after washing can contain considerable quantities of benzol. The problem of utilizing this residual gas, which can represent an air pollutant, has been resolved by washing the gas once more with water at temperatures of 5 to 25 C; the benzol is then being separated from the rising gas mixture. This separation can be effected through the absorption of benzol by active carbon or silica gel so that the remaining residual gas can no longer be considered an air pollutant. The preferred method of isolating the benzol is washing the last mentioned gas mixture with a suitable liquid hydrocarbon, such as fuel oil No. 1 or 2, or liquid paraffin. The benzol is then removed from the benzol carrying hydrocarbons by water vapor distillation. Instead of the complete recovery of the benzol from the gas mixture, part of the gas mixture can be recycled into the oxidation process.

18705 **APTIC NO. 37695**

Ihlefeldt, H.

MEASURES FOR REDUCING THE ALKALI CYCLE IN THE LEPOL KILN.

(Massnahmen zur Verminderung des Alkalikreislaufs im Lepolofen). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(1):15-17, Jan. 1972. (Presented at the Verein Deutscher Zementwerke Congress, Duesseldorf, West Germany, Sept. 28-Oct. 1, 1971.)

Two Leopol kilns were each fitted with a bypass system and the alkalies were precipitated in a separate electrostatic precipitator to reduce the alkali cycle. Output for the kilns was increased from 75 to 107% for one kiln and to 120% for the other. The alkali content of the clinker decreased from 2.19 to 1.62%. The heat consumption was improved since the bypass gas can be used for drying the raw material. Of the sulfur introduced into the kiln, only about 40% was bound in the clinker and about 59% was collected with the dust as sulfate. Sulfur dioxide emission was negligible.

18706 **APTIC NO. 37290**

Imris, Pavel and William F. Babich

DEVICE FOR CLEANING GASES.

(Vorrichtung zum Reinigen von Gasen). Text in German. (Assignee not given.) W. Ger. Pat. 1,940,642. 3p., May 19, 1971. 8 refs. (Appl. Aug. 9, 1969, claims not given).

A device for cleaning gases is described wherein the gases enter at the bottom. The device, a column, if filled with water or some other fluid. A rotor dips into the water. The rotor consists of two disks carried by a hollow shaft. A number of radial vanes are arranged between the two disks in radial manner. The importance of the vane arrangement is that it leaves a free space between disks and shaft in the center. The gas is drawn on through the hollow shaft. Through the particular vane arrangement, no clogging of the openings can occur which is the case with a similar device but different vane arrangement.

18707 **APTIC NO. 37568**

Ishihara, Soichi

A PREMISE FOR DEVELOPMENT OF NON-POLLUTION MOTOR VEHICLE.

(Mukogai jidosha jitsugen eno zentei). Text in Japanese. Jurisuto (Jurist), no. 492:119-124, Nov. 10, 1971. 23 refs.

Investigations and studies for the purpose of reducing emissions from motor vehicles, in addition to enacting laws and ordinances regulating air pollutant emissions, have been made. The establishment of low emission standards may prevent air pollution within a certain limit, but it may be impossible to strengthen the regulation standards beyond the technology which may be achievable by motor vehicle manufacturers. Giving priority to strengthening regulation standards may reduce the technology level. Gases emitted from motor vehicles, new motor vehicle engines, and fuel additives are discussed. The Onishi low emission engine has miniturized and simplified recipro-two-cycles; it reduces emissions of oxides of nitrogen by slow combustion and reduces noise and vibration. The recipro-engine is the best way to achieve non-pollution.

18708 **APTIC NO. 37223**

Jackson, Dennis Hurshal

EFFLUENT-CONTROLLING APPARATUS FOR PURIFYING AIR AND WASTE GASES.

(Ausstroem-Kontrollvorrichtung zum Reinigen von Luft und Abgasen). Text in German. (Assignee not given.) W. Ger. Pat. 2,105,375. 12p., Aug. 12, 1971. (Appl. Feb. 5, 1971, 5 claims).

A scrubbing tower for waste gases is attached to the top of a stack and fitted with superimposed inclined baffles that are wetted from pipes connected to a jacket coaxial to the inner wall. The liquid is provided by one of several circulators and exits to one or more receiver tanks where suspensions and entrained air are liberated. The device can be made portable.

18709 **APTIC NO. 37236**

Johnsen, R. and E. Bohm

CHLORINE PRODUCTION WITH HIGHLY REDUCED MERCURY EMISSION.

J. Appl. Electrochem., 1(3):163-166, Aug. 1971. 10 refs.

A new electrolytic chlorine plant in Sweden was designed and constructed to reduce as far as possible mercury contamination of air and water. Important design features were specially designed electrolytic cells, strict segregation and extensive reuse of mercury-contaminated water, central drainage of floors to waste water-collecting facilities, special treatment of brine sludge, special purification procedures for hydrogen and caustic soda, and final purification treatment for waste water. The hydrogen purification processes comprises cooling to 25 C, compression to 3.5 atm, and a second cooling to 5 C. Caustic soda is purified by filtration in a precoat filter containing activated carbon. Water purification involves chemical reduction of any ionic mercury to the metallic form and removal of the metal from the water phase by means of a precoat filter and a special activated carbon. The mercury discharge with the hydrogen is somewhat lower than 0.5 m g/Hg ton chlorine; the mercury content of the treated water averages 0.3 ppm; and the mercury content of the treated caustic soda is about 0.2 g/cu m.

18710 **APTIC NO. 37310**

Johnson, D.

AIR POLLUTION PRACTICE IN THE UK STEELMAKING INDUSTRY.

Iron Steel (London), 44(6):463-466, Dec. 1971. 2 refs.

Gas cleaning equipment has been used on blast furnaces for many years to enable the gas from off-takes to be used as low-grade fuel. However, air pollution also arises in other areas of ironmaking: ore preparation, coke making, and blast-furnace operation. Pollution problems connected with each of these manufacturing steps are discussed and control methods are suggested. Pollution problems in steelmaking are reviewed with special reference to blast furnaces and electric-arc furnaces using injected oxygen. Cleaning systems for arc-furnace gases are reviewed as are three methods of fume containment: roof mounted hoods, direct obstruction, and semidirect obstruction. The complex engineering problems involved in the control of air pollution from LD operations and a new restricted combustion high-energy wet-cleaning system for the LD process are also discussed. Fume-arrestement systems for the Kaldo and Rotor processes are summarized. Electrostatic precipitators, spray towers, process modifications, and collectors can be used.

18711 APTIC NO. 37097

Johnson, William C. and Lloyd L. Kempe

EXPERIENCES IN CONTROLLING ATMOSPHERIC POLLUTION ENCOUNTERED IN PHARMACEUTICAL MANUFACTURING PROCESSES. *J. Air Pollution Control Assoc., 9(1):32-35, 38-41, May 1959. 1 ref. (Presented at the Air Pollution Control Association, Annual Meeting, 51st, Philadelphia, Pa., May 25-29, 1958.)*

A planned, coordinated approach to the evaluation of odor sources from antibiotics manufacturing processes is presented. This approach includes development of an odor reporting network, correlation of the network data with weather information, coding and recording on a map overlay, and finally evaluation of the information. Attack on the odor problems included laboratory investigation, pilot model studies, process modification, and plant installation of control equipment. Antibiotic fermentation vent gas odors were eliminated with activated carbon. Putrid odors from a polluted swamp were controlled through conversion of the swamp to an oxidation pond, and odors from the manufacture of an anti-coagulant were controlled by absorption in chlorinated water. A program publicizing the control program and some of the problems involved pays dividends in community tolerance of minimum odor levels that may defy elimination. (Author summary modified)

18712 APTIC NO. 37276

Jones, James H. and Ervin E. Weaver

EXHAUST GAS PURIFICATION. *(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,599,427. 6p., Aug. 17, 1971. 5 refs. (Appl. Sept. 22, 1969, 4 claims).*

A process is described for the effective removal of carbon monoxide, hydrocarbons, and nitrogen oxides from the exhaust stream of internal combustion engines. This is accomplished by passing the exhaust gas from an engine operating at near the stoichiometric fuel-air ratio through a high temperature catalyst. This catalyst is normally a noble metal catalyst. The exhaust gas is then cooled to approximately 700 F, ammonia is added, and the ammoniated stream is passed over a second catalyst which can be either a base metal catalyst or a noble metal catalyst. This process differs from the prior art in that the catalytic beneficiation of the exhaust stream is accomplished in two distinct steps, one operating at high temperature and the other at a lower temperature. (Author abstract modified)

18713 APTIC NO. 37284

Jonsson, Sven-Erik

CURRENT PROBLEMS OF ENVIRONMENT PROTECTION AT SMALLER SULPHITE MILLS. *(Aktuella miljovardsproblem vid mindre sulfitfabriker). Text in Swedish. Norsk Skogind. (Norway), 25(11):336-346, 1971.*

Sulfate and sulfite plants in Sweden are required by legislation to take measures to control water and air pollution. In water pollution control, sulfite plants have to reduce solids discharge, biochemical oxygen requirement, and the discharge of filterable materials. In air pollution control, sulfur dioxide and dust emissions should be reduced. Various fluid recovery systems using soluble magnesium, sodium, and ammonia are described and evaluated. Magnesium and some sodium methods are attractive for small sulfite plants in Sweden, while the ammonia method presents some complications. The liquor condensation is made in multi-stage vacuum stations, back-pressure stations, and thermocompressor stations. For liquor incineration, mostly Loddby type furnaces are used. The smokes from the liquor incineration are cleaned by dust collectors and sulfur dioxide absorption. Such smokes contain high percentages of dust. While smokes from calcium-base liquor contain sulfur dioxide in high concentrations, electrofilters of medium capacity are sufficient for smokes from magnesium-base liquor. A combination of four venturi scrubbers is preferably used. General calculations are made of the costs of environmental protection measures by sulfite plants. Total costs for Ca-base plants are $3-4 million and those for Mg-base plants lie at $4-5 million. Various systems and the related investments are outlined.

18714 APTIC NO. 37116

Kaneko, Yasuo, Hiroshi Kuroda, and Kazuyuki Tanaka

SMALL ENGINE - CONCEPT EMISSION VEHICLES. *Preprint, Society of Automotive Engineers, Inc., New York, 19p., 1971. 5 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710296.)*

Three Japanese automobile manufacturers are engaged in research and development work on thermal reactor-exhaust gas recirculation (EGR) and catalytic converter systems for small engine vehicles. The companies are participants in the Inter-Industry Emission Control Program which aims at developing a virtually emission-free vehicle. Specific emission targets are 0.82 g/mile for hydrocarbons, 7.1 g/mile for carbon monoxide, 0.68 g/mile for nitrogen oxides, and nil loss from the crankcase. The emission levels of three concept vehicles developed by the Japanese companies meet the IIEC goals at low mileage. Control packages for the vehicles are a thermal reactor plus EGR, using leaded or unleaded gasoline; a hydrocarbon-carbon monoxide converter plus EGR, using unleaded or low-lead gasoline; and a hydrocarbon-carbon monoxide catalytic converter, using unleaded gasoline. Each package will require further research for improvement in fuel economy, durability, and driveability, as well as the establishment of good maintenance characteristics.

18715 APTIC NO. 37549

Kasaoka, Sigeaki and Eiji Sasaoka

ADSORPTION OF SULFUR DIOXIDE ON ACTIVATED CARBONS AND ZEOLITES. *(Kasseitan oyobi zeoraito ni yoru aryusan gasu no kyuchaku). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(11):2213-2218, 1971. 8 refs.*

Adsorption isotherms and rates were measured for sulfur dioxide-nitrogen systems on activated carbon and zeolites (molecular sieves) of cylindrical or spherical shapes by using a thermanobalance. The experiments were carried out in a flow apparatus at 30-120 C and under atmospheric pressures. Sulfur dioxide concentrations were approximately 0.83-8.33 mol%. The adsorption equilibriums were given by the Freundlich isotherms. The adsorption rates on activated carbons were well described by the diffusion model (throughout the whole interior surface), while the adsorption on zeolites proceeded in accord with the shell model (inward toward the center, shrinking the unadsorbed core). Temperature dependencies of adsorption rate constants (per unit volume or per unit area) are given.

18716 APTIC NO. 37558

Kawasugi, Hidetaro

THE MECHANISM AND PERFORMANCE OF ELECTROSTATIC PRECIPITATOR. *(Denki shujin sochi no kozo to seino). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(1):57-62, Jan. 1972.*

The basic principle of the Cottrel electrostatic precipitator, its mechanism, performance, and various factors influencing the dust collection efficiency are discussed. An electrostatic precipitator comprises a gas flow guiding board, collection electrodes, a discharge electrode, a rapping device (hammering or vibrating), and a power source. The collection rate can be expressed in a formula, but various factors influence the performance of an electrostatic precipitator, such as the type of dust, the balance of the collection efficiency and dust concentration, fluctuation in the gas flow quantity, the gas temperature, the water content in the gas, and the amount of incompletely burned gas.

18717 APTIC NO. 37373

Kearby, Kenneth K., Harold N. Miller, Anantha K. S. Raman, and Joseph Vardi

CATALYTIC CONVERSION OF EXHAUST GAS IMPURITIES. *(Esso Research and Engineering Co., Linden, N. J.) U. S. Pat. 3,565,574. 4p., Feb. 23, 1971. 7 refs. (Appl. April 23, 1968, 4 claims).*

A method is presented for purifying exhaust gases containing unburned hydrocarbons, carbon monoxide, and nitrogen oxides by contacting the exhaust gases with an unsupported catalyst comprised of a metal or alloy of Groups I-B and IV to VIII of the Periodic Table. Combustion in an afterburner with auxiliary fuel at high temperatures or catalytic oxidation at high temperatures has been previously used to consume partially burned hydrocarbons. The first system has a major disadvantage in complexity as well as in nonproductive use of fuel; the second system has the disadvantage of employing a catalyst demanding frequent regeneration or removal. The present process can be used for treating exhaust gases of internal combustion engines in a multiple zone system at temperatures in excess of 800 F, without the addition of external air or oxygen.

18718 APTIC NO. 37421

Keith, Carl. D., Teunis Schreuders, and Charles E. Cunningham

APPARATUS FOR CATALYTIC CLEANING OF EXHAUST GASES FROM INTERNAL COMBUSTION ENGINES. *(Vorrichtung zur katalytischen Reinigung der Auspuffgase von Brennkraftmaschinen). Text in German. (Engelhard Industries Inc., Newark, N. J.) W. Ger. Pat. 1,476,507. 4p., Nov. 11, 1971. 7 refs. (Appl. June 21, 1966, 4 claims).*

The catalyst, consisting of platinum, palladium, or iridium is inserted in a cylindric housing between radially oriented ring flanges of the two end walls for the inlet and outlet to provide a tight connection in the axial direction. The ring flanges on the end walls are directed to the inside, and have gas-tight connection to the housing. A springy corrugated part is inserted in a ring slot between the housing and the catalyst body, providing tight enclosure for the latter. The springy corrugated part is made of wire netting. The catalyst body is coated on its circumference with a layer of aluminum silicate to close pores. The chamber end walls for the inlet and outlet narrow in a conic shape to the outside. In this arrangement, excessive pressure loads on the catalyst body are eliminated, and proper heat insulation is reached without the risk of one part of the exhaust gas by-passing the catalyst body.

18719 APTIC NO. 37118

Kettner, Helmut

REMOVAL OF SULFUR DIOXIDE FROM EFFLUENT GASES. *(Die Entfernung von Schwefeldioxyd aus Abgasen). Text in German. Luftverunreinigung, 1962:36-39, 1962. 11 refs.*

Dry flue gas desulfurization methods have the advantage of yielding purified gas of still relatively high temperature. Effluent gases are countercurrently passed over an absorbent which effects the desired separation. High separation efficiency is synonymous with compactness of the installation, with short contact time, and with a high rate of flow. To prevent corrosion of high-pressure boilers, additives are added to the fuel or the waste gas to transform the corrosive sulfur oxides into harmless compounds. Suitable are ammonia, sodium hydroxide, dolomite, iron oxide, and zinc oxide. Various other absorbents have been tested such as a mixture of activated aluminum oxide gel containing 60% aluminum oxide and 30% sodium oxide which at 130-330 C absorbs 24% of its weight in sulfur dioxide. The manganese oxide process produced precipitates manganese sulfate with sodium hydroxide which absorbs 25-37% of its weight of SO2. The Reinluft process oxidizes SO2 to sulfur trioxide on activated carbon in the presence of oxygen yielding sulfuric acid, which is desorbed. Semicoke has similar adsorptive properties. The Reinluft process also can be applied to hydrogen sulfide, carbonyl sulfide, carbon disulfide, nitrogen oxides, tar, and hydrocarbons. Capital investment amounts to 10% of power plant investment, operational costs run to one dollar/t oil with two percent sulfur or to $1.25/t oil with 3.5% S. A more recent method developed by Wickert desulfurizes oil before combustion by vaporizing it with one third oxygen needed for complete combustion in the presence of steam and a catalyst, thus converting sulfur to hydrogen sulfide. The H2S is converted to calcium sulfide with calcium carbonate in an absorber.

18720 APTIC NO. 37434

Khalafalla, S. E. and L. A. Haas

THE ROLE OF METALLIC COMPONENT IN THE IRON-ALUMINA BIFUNCTIONAL CATALYST FOR REDUCTION OF SO2 WITH CO. *J. Catalysis, 24(1):121-129, Feb. 11, 1972. 10 refs.*

The interaction of low concentrations of sulfur dioxide with carbon monoxide proceeds efficiently on a bifunctional iron-alumina catalyst. The iron component in the pelletized, mixed catalyst was rapidly transformed to pyrrhotite, iron sulfide, with an apparent decrease in activity. The catalyst effectiveness then remained steady for a prolonged period of time. Catalyst decay can be temporarily delayed by carbidizing its iron component. A carbonyl sulfide by-product begins to form when all the iron surface is sulfidized; hence it was absent in the effluent gas during the catalyst break-in period. Red bauxite and Surinam red mud showed promise as commercial catalysts for recovery of sulfur from sulfurous waste gases. (Author abstract)

18721 APTIC NO. 37115

Kholin, B. G., L. M. Chernyak, and S. A. Kolesnikov

TEST OF FAN ATOMIZER FOR ABSORPTION OF FLUORINE-CONTAINING GASES IN THE PRODUCTION OF SUPERPHOSPHATE. *Sov. Chem. Ind. (English translation from Russian of: Khim. Prom.), no. 4:286-287, April 1971. 13 refs.*

Fine-dispersion atomization of the liquid is one of the most powerful means of intensifying mass-transfer processes between a liquid and gas. The intensity of the absorption process with fine atomization can be increased by using rotating perforated cans, particularly with outflow openings of relatively large diameter. This makes it possible to create a reliable, highly productive, and economic design for a fan liquid atomizer which then can be used to absorb fluorine-containing gases in the production of superphosphate.

18722 APTIC NO. 37231

Kirpichev, Ye. F. and V. V. Matsnev

PERFORMANCE OF ELECTROFILTER DGPN IN PURIFICATION OF FLUE GASES IN COMBUSTION OF IRSHA-BORODINO COAL. *(Rabota elektrofiltra DGPN na dymovykh gazakh pri szhiganii irsha-borodinskogo uglya). Text in Russian. Elektr. St. (Moscow), 42(7):33-36, 1971. 2 refs.*

The data on performance of electrostatic filters for purification on flue gases formed during the combustion of coal in a coal-pulverizing furnace with liquid slag removal were obtained and the physico-chemical properties of light ashes were studied, on which the process of electrosedimentation depends. The degree of purification of flue gases depended on their velocity. The efficiency of individual sections of electrostatic filters was 98%; at the same time, the concentration of ashes at the exit from the electrofilter section was 0.06-0.42 g/cu m. The chemical composition of removed ashes is characterized by a high content of calcium oxide (about 28%). As far as fractional composition of ashes is concerned, the highest content had particles of size 4-12 micron and 2-7 micron at the entrance to and exit from electrofilter, respectively. Maximum concentration of ashes in the atmosphere near the ground at a distance of 3600 m was considerably lower than maximum permissible concentration (0.019-0.033 mg/cu m).

18723 APTIC NO. 37377

Kleinfelder, Earl Ocus and Herbert Valdsaar

PROCESS FOR SCRUBBING WASTE GASES. *(DuPont de Nemours (E. I.) and Co., Wilmington, Del.) U. S. Pat. 3,564,817. 2p., Feb. 23, 1971. 4 refs. (Appl. May 16, 1969, 3 claims).*

In various stages of the production of titanium tetrachloride, a waste gas is produced which contains small amounts of chloride contaminants. The waste gas cannot be discarded by conventional disposal techniques and cannot be purified by conventional processes inexpensively and effectively. A two step scrubbing process is described for removing small amounts of titanium tetrachloride and other chloride impurities from the waste gas produced during the chlorination of a titaniferous ore. The gas is first acid scrubbed with sulfuric acid of 75-95 weight % concentration and then it is scrubbed with water to produce a clear gas that may be vented to the atmosphere without fuming. (Author abstract modified)

18724 APTIC NO. 37702

Knapp, C. E.

RECLAIMING MUNICIPAL GARBAGE. *Environ. Sci. Technol., 5(10):998-999, Oct. 1971.*

Franklin, Ohio, has become the first municipality in the nation to adopt and support a new type of recycling plant for municipal solid wastes. The $2 million unit takes unsorted household garbage, as collected from refuse trucks, and processes it to reclaim glass, metals, and paper fibers. Although it is operating initially on a one-shift basis and handling about 50 tons/day of garbage, the plant has a 150 ton/day capacity and is projected to take care of the area's solid waste problem through 1990. The first step in the process converts raw garbage into liquid slurry, by feeding the raw waste into a water-filled Hydrapulper where a powerful rotor reduces pulpable materials. The second major step is removing most of the inorganic material from the 3 1/2% slurry in the Hydrapulper. The exhaust gases are cleaned of particulate matter by a venturi scrubber. The residue is hauled to a sanitary landfill. An addition to the solid waste plant will refine the mixture of aluminum and glass from the cyclone step for reuse. Also, the possibility of energy recovery from the fluid bed reactor cannot be overlooked. Costs are cited.

18725 APTIC NO. 37273

Kobayashi, Akira

METHOD AND APPARATUS FOR REDUCING POLLUTANTS IN THE EXHAUST GAS OF AN INTERNAL COMBUSTION ENGINE. *(Kabushiki Kaisha Toyota Chuo Kenkyusho, Nagoya-shi (Japan)) U. S. Pat. 3,602,202. 10p., Aug. 31, 1971. 9 refs. (Appl. Nov. 25, 1969, 9 claims).*

A method and apparatus are provided for reducing pollutants in the exhaust gas of an internal combustion engine by supplying additional oxygen and nitrogen, separately, into the air-fuel mixture prior to combustion, depending upon the operating condition of the engine. The oxygen or nitrogen is supplied selectively in response to the opening of the throttle valve of the carburetor through a valve mechanism interlocking with the throttle valve. Rather than utilizing oxygen and nitrogen cylinders which must be refilled with these gases at intervals, a container of zeolite particles may be utilized for a much longer and more continuous period of time to separate oxygen and nitrogen from air supplied to the container.

18726 APTIC NO. 37436

Kretschmer, Yama K.

EXHAUST GAS TREATMENT MEANS. *(Assignee not given.) U. S. Pat. 3,595,015. 4p., July 27, 1971. 4 refs. (Appl. Feb. 18, 1970, 3 claims).*

While many attempts have been made to eliminate noxious gases from motor vehicle engine exhausts, the devices developed have been expensive, have failed to work effectively, or have required replacement or repair from time to time. A method and apparatus are presented for treating exhaust gas from an internal combustion engine. Air from the atmosphere is mixed with the exhaust gases flowing through the tubular housing in the exhaust pipe of the vehicle. A portion of the air-gas stream is diverted and flows in the direction opposite to the direction of the entering exhaust gases. The diverted portion of the air-gas stream is ignited and returned to the main air-gas stream. (Author abstract modified)

18727 APTIC NO. 37390

Krochta, Harry

GAS SCRUBBER. *(Gaswaescher). Text in German. (Ducon Co., Inc., Mineola, N. Y.) W. Ger. Pat. 1,571,759. 8p., Sept. 30, 1971. 6 refs. (Appl. March 24, 1966, 3 claims).*

The gas scrubber has a baffle which divides the horizontal, cylindric housing into two chambers. The baffle has an extension in a liquid outlet below the housing to divide the liquid outlet into two chambers. These two chambers are connected by a sump below and spaced from the end of the baffle. A cresent-shaped opening in the baffle forms a connection between the housing chambers near the housing wall, yet opposite to the liquid outlet. The lower part of one of the housing chambers has a longitudinal opening close to the liquid outlet to allow the liquid to flow down on the inside of the wall. Thus, no dust build-ups can occur on the walls. An intense blending of gas flow and liquid is provided by a narrowed gas inlet.

18728 APTIC NO. 37389

Kruel, Martin

BASIS OF A DRY PROCESS OF FLUE GAS DESULPHURIZATION. *(Die Grundlagen eines Abgasentschwfelungsverfahrens mit trockener Verfahrensweise). Text in German. Brennstoff-Waerme-Kraft, 23(3):91-97, March 1971. 11 refs.*

Sulfur oxides in flue gases are adsorbed on activated carbon from bituminous coals in a process operating at 100-180 C. The carbon is thermally regenerated. Adsorbent properties were studied in fixed beds using model and actual flue gases from heavy oil-fired boilers. The plant, regeneration of the adsorbent, and the results are described.

18729 APTIC NO. 37032

Kuo, J. C. W., C. R. Morgan, and H. G. Lassen

MATHEMATICAL MODELING OF CO AND HC CATALYTIC CONVERTER SYSTEMS. *Preprint, Society of Automotive Engineers, Inc., New York, 46p., 1971. 18 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710289.)*

An operational catalytic converter mathematical model that includes most of the important chemical and physical processes of a catalytic converter system for automobile application is described. Examples are included which illustrate that the model successfully predicts the performance of an actual vehicle-converter system. Some of the important variables for the converter systems described are catalyst density and heat capacity, catalyst activity, initial bed temperature, inlet exhaust gas composition and temperature, and converter location. Some of the variables of relatively minor importance are exhaust gas flow rate, heat loss from the converter, heat effect of inlet louver, oxygen concentration in excess of 2%, and gas channeling in the catalyst bed. Applications of the model to converter design, catalyst design, and determination of the inlet exhaust gas requirements are illustrated. The experimental determination and analyses of the apparent oxidation kinetics on a typical catalyst are also described. (Author summary modified)

18730 APTIC NO. 37376

Lasky, Jack S. and Ronald W. Fuest

PROCESS FOR REMOVAL OF SO2 FROM FLUIDS. *(Assignee not given.) U. S. Pat. 3, 564,818, 4p., Feb. 23, 1971. 3 refs. (Appl. Dec. 11, 1968, 10 claims)*

A process is described for removing sulfur dioxide from a fluid such as water or waste gas by passing the fluid through a material formed from a polyolefin, polyester, or nylon in admixture with a nitrogen-containing polymer. When polymeric amine-containing materials are cospun with melt-spinnable fiber-forming resins, the fibers so produced are capable of being regenerated either by thermal or chemical means to restore the sorptive capacity for reuse, as well as to recover the sulfur dioxide as a valuable by-product.

18731 APTIC NO. 37460

Lauro, Gustavo

SMOKE CONTROL DEVICES IN DOMESTIC HEATING INSTALLATIONS. *(I depuratori di fumo negli impianti di riscaldamento delle abitazioni civili). Text in Italian. Audiotecnica News, no. 1-6:149-160, Jan.-Dec. 1971. (Presented at the Congresso Nazionale per la lotta contro fumi e rumori, Genova-Nervi, Italy, 1958.)*

Domestic heating plants are encumbered with a disproportion between the burner and furnace combustion chamber which makes efficient combustion difficult to achieve. Smoke control implies control of particulates and of noxious gases. Particulates can be partly controlled by dry methods, noxious gases by wet purification which is also applicable for the control of fine dust. Dry separation of particulates is based on the action of gravity and of inertia. The forces of mass which cause a particle to be separated from a gas flow can be multiplied by centrifugal force. The smallest particles which can be separated by dry methods are those of a diameter of 0.25 micron, thus dry purification of combustion gases represents only the first step in complete purification. Wet separators, spray scrubbers, work by a double effect, on one hand saturated vapor surrounding each droplet wets particles suspended in the gas rendering them heavier and more prone to become attached to other droplets, on the other water droplets absorb soluble anhydrides and are thus converted to acids. Even some hydrocarbons condense through the effect of these scrubbers. Most of the devices look like large pots and are placed on chimney tops. The smoke enters at 200 C and leaves the scrubber at 80 C. The drawback of these devices is that they corrode easily. Another smoke purification method by supersaturated steam is based on the property of particles and ions to act as condensation nuclei for supersaturated steam. This method removes both particulates and noxious gases from combustion gases quantitatively and has the advantages that the apparatus can be placed at the base of the chimney and that part of the heat contained in the combustion gases can be converted into hot water and thus recovered.

18732 APTIC NO. [illegible]

Leclerc, G.

SURFACE TREATMENT EFFLUENTS - PROBLEMS AND SOLUTIONS. *(Les effluents de traitement de surface: problemes et resolutions). Text in French. Galvano (Paris), 40(407):39-46, Jan. 1971.*

Sources of plating effluents, such as various types of rinsing baths, fume scrubbers, filters, and cooling water, are covered and ways of reducing disposal problems by reducing the amount of pollutant and the volume of effluent are discussed. Worked examples with diagrams are given for pickling, hard chrome plating, and an automatic cyanide waste treatment plant. Detoxication of treatment residues and the elimination or recovery of heavy metals such as zinc and cadmium are included.

18733 APTIC NO. 37759

Lehnert, Raymond M. and Clyde A. Snyder

APPARATUS FOR FILTERING SUSPENDED SOLIDS FROM GASEOUS MEDIUM AND FOR REMOVAL OF FILTER CAKE FROM FILTER ELEMENTS. *(Wheelabrator Corp., Mishawaka, Ind.) U. S. Pat. 606,736, 10p., Sept. 21, 1971. 3 refs. (Appl. June 16, 1969, 8 claims)*

A method and apparatus are presented which represent a marked improvement to the jet principle for the removal of solids collected on the surfaces of filter elements. Use is made of elongate filter elements with an open end and means for letting the gaseous medium containing the suspended solids through the walls of the filter element. Separated solids collect on the outer wall of the filter element as a filter cake. A gas nozzle is placed in endwise alignment and colinear arrangement with one or more auxiliary nozzles followed by a venturi for releasing or generating a burst of gas of high pressure and increasing volume into the interior of the filter tube. This will effect removal of solids collected on the walls of the tube without stopping filter flow as in previous removal methods. (Author abstract modified)

[illegible] APTIC NO. 37598

Lemoine, Pierre and Gerhard Will

THE BROWN FUMES. *[illegible] 10(1):73-8[illegible], Sept. 1971. 8 refs.*

Problems relating to the control of brownfumes in oxygen-blown steelmaking [illegible]. The technique of refining pig iron by means of oxygen and the physical characteristics of the fumes and the carrier gas are examined. The fumes which are [illegible] gases containing suspended microscopic particles of iron oxide, can be collected either after combustion of the gas (mainly carbon monoxide) in the ambient air or without combustion of the gas in the latter case by preventing the ingress of air between the converter mouth and the collecting hood. Installations for dust removal include bag filters, wet scrubbers, and dry electrostatic filters.

[illegible] APTIC NO. 37687

[illegible]

GAS PURIFICATION UNIT FOR NONFERROUS METAL REMELTING [illegible]. *(Beschreibung einer Gasreinigungsanlage [illegible] Nichteisenmetall-Umschmelz[illegible]). [illegible] Luftverunreinigung, 1970:18-21, Dec. 1970.*

The design and operation of [illegible] unit for nonferrous [illegible] are described. The waste gas enters the unit at [illegible]. The water [illegible]. The unit is lined [illegible] problems [illegible]

[illegible] APTIC NO. 37272

[illegible]

[illegible] *[illegible] 4 refs. (Appl. [illegible] 1969 [illegible])*

An exhaust system is [illegible] suction hose can be moved [illegible] without necessitating any coupling [illegible] and which can be put in operation wherever it is desired. Characteristic features of this system reside in that one or more substantially fixed duct portions having a suitably slot-shaped opening are disposed along one or more sections of an overhead track, and that trolleys supporting the tapping units and associated ducts or hoses are adapted to run along the overhead track suitably suspended in the premises. In large areas with heavy air contamination it is not acceptable for reasons of heat economy and because of cross drafts to arrange a supply of fresh air. Previously, the suggestion of providing ducts or hoses to the source of contamination has only been suitable for stationary machines or those machines movable within very narrow confines. The present arrangement avoids the installation of valves or dampers at each exhaust point.

18737 APTIC NO. 37740

List, Hans

DISCUSSION OF CONSTRUCTIONAL PROBLEMS OF MODERN DIESEL ENGINES. *(Die Behandlung konstruktiver Probleme neuzeitlicher Dieselmotoren). Text in German. Motortech. Z. (Stuttgart), 33(3):100-108, March 1972. 10 refs.*

Each engine designer is confronted with two problems in connection with environmental protection: noise abatement and exhaust gas decontamination. The toxic components in the exhaust gas of diesel engines are the oxides of nitrogen, heavy hydrocarbons, and carbon monoxide. In indirect fuel injection, generally a low pollutant concentration is found in the exhaust gas. This combustion method has disadvantages; through better mixing and charging, an attempt is made to stay below the maximum allowable emission concentrations for diesel engines. Experiments have shown that this is feasible. After a general survey of the construction of some particularly critical components of the diesel engine, the construction of the cylinder head, the piston, driving rod, crank shaft, bearings, stirring system, and valves are discussed.

18738 APTIC NO. 37112

Lorentz, Fred

CHARCOAL ADSORPTION OF SODIUM DITHIOFORMATE VAPORS. *Ind. Water Wastes, 6(6):180-181, Nov.-Dec. 1961.*

Design and operation are discussed of an effective charcoal scrubber used to adsorb malodorous sodium dithioformate vapors originating in the synthesis of Vitamin B1. The entire process building is maintained under a slightly negative pressure relative to the atmosphere with a low speed exhaust fan drawing 12,000 cfm at three-eighths inch static pressure through a manifold duct system connected to the vents of about 15 pieces of equipment. Additional inlets to the duct system draw air from the general area within the building and the entire mass is discharged through the filter system. The air first passes through the air conditioning-type dust filters to prevent the bed of activated charcoal from becoming clogged with inert particulate matter. On leaving the dust filter the odor-laden air passes through a distribution plate bearing 503 charcoal canisters. Each canister presents approximately one square foot of activated charcoal bed five-eighths inch thick to the air stream. About 800 lbs of fresh carbon will pick up 300-400 lbs of airborne materials in a four to six month cycle.

18739 APTIC NO. 37391

Mallozzi, F.

WET COLLECTORS CONTROL DUST AND AIR POLLUTION. *Can. Mining Met. Bull. (Montreal), 64(714):77-84, Oct. 1971. (Presented at the General Meeting of the Canadian Inst. Mining and Metallurgy, General, Meeting. Annual, 73rd, Quebec, April 1971.)*

The principal forces used by wet collectors to separate particulate matter from gas streams and the different types of wet collectors available are reviewed. The various types are grouped according to pressure drop, i.e., spray chambers and spray towers (low pressure drop); wet centrifugal collectors, wet dynamic precipitators, wet orifice-type collectors, packed towers, and atomizing impingers (medium pressure drop); and venturi scrubbers (high pressure drop). Important factors in the selection of collection equipment, such as collection efficiency, horsepower requirements, and water consumption, are discussed in detail, as well as construction features normally incorporated to circumvent potential problems.

18740 APTIC NO. 37271

McCrocklin, James W.

EMISSION CONTROL DEVICE. *(Assignee not given.) U. S. Pat. 3,601,982. 5p., Aug. 31, 1971. 8 refs. (Appl. June 25, 1969, 5 claims).*

Concentric inner and outer housings of a combined acoustical muffler and afterburner for internal combustion engines form a passageway through which fresh air is introduced. As the fresh air flows along the passageway, it is preheated by conduction through the wall of the inner housing and it is then mixed with the incoming exhaust gas. The mixture is passed through tubes in the inner housing and is then ignited. This mixture is caused to flow first in one direction along the outside of the tubes to superheat the mixture, and then in the opposite direction while scrubbing along the inner surface of the wall of the inner housing, thereby preheating the incoming fresh air. A wire filling the space between the inner and outer housings is spiralled around the inner housing to lengthen the passageway for the incoming fresh air to maximize the heat transfer between the hot combustor wall and the incoming fresh air. Thus, more uniform temperatures are produced, ensuring efficient emission control even during relatively cold engine operating cycles. (Author abstract modified)

18741 APTIC NO. 37627

McCrocklin, James W.

EMISSION CONTROL ASSEMBLY. *(Assignee not given.) U. S. Pat 3,603,080. 7p., Sept. 7, 1971. 6 refs. (Appl. June 25, 1969, 8 claims).*

An afterburner is described to effectively complete the combustion of unburned hydrocarbons and carbon monoxide in the exhaust of internal combustion engines, over a wide range of load and engine speed conditions. Inner and outer housings of a combined muffler and emission control device define a passageway for incoming air. Exhaust gas is introduced into the inner housing and is mixed with a portion of the incoming air. Then it is ignited and mixed with further incoming air. The burning gas is used to preheat the incoming air by heat exchange through a wall of the inner housing, and flow reversal within the inner housing is employed to produce an acoustical muffling effect. (Author abstract modified)

18742 APTIC NO. 37628

McCrocklin, James W.

EMISSION CONTROL MEANS. *(Assignee not given.) U. S. Pat. 3,603,081. 4p., Sept. 7, 1971. 6 refs. (Appl. June 25, 1969, 2 claims).*

A device is described for reducing the emission of unburned hydrocarbons and carbon monoxide to acceptable levels in the exhaust gas of an internal combustion engine. The device will control emissions under various engine operating conditions, while being capable of continuing operation without requiring an inordinate amount of maintenance. Incoming air is efficiently preheated and then mixed with incoming exhaust gas in a mixing chamber of an afterburner which includes an expansion portion discharging the mixture to an ignition zone. The ignition zone contains a plurality of circumferentially spaced flame holding rods and an ignition device or devices such as a glow plug, which initiates burning. The rods assure continuity of the flame. A flow reverser for the burning gas may be used to maintain the hotness of the wall of an inner housing so that incoming air flowing between the wall of the inner housing and an outer housing wall is preheated.

18743 APTIC NO. 37332

McLean, G.

FIBREGLASS REINFORCED PLASTICS FOR INDUSTRIAL CHIMNEYS. *Clean Air, 5(4):60-64, Nov. 1971. (Presented at the Clean Air Society, New South Wales Branch, Australia, Aug. 1970.)*

Raw materials, manufacturing techniques, and design criteria for fiberglass reinforced plastic chemneys are described. Reinforced plastics are made by combining cold-set resins with suitable reinforcing materials. Polyesters are the most used resins, while the most commonly used form of glass fiber is produced as Chopped Strand Mat. Fillers are powdered materials which are incorporated into the resins to impart specific properties to the finished plastics product. Production of a moulding and resin/glass ratios are indicated. Normally, laminates with glass contents between 25 and 30% are used. Tensile values, end to end compression values, face to face compression value, shear values, and the coefficient of expansion are important design considerations. Temperature limitations, specific gravity and weight of structures, fire resistance, guys, slenderness ratio, self-induced forces, and connections to chimmeys are considered, as well as air bleeds, condensate collection, thermal insulation, and resistance to air flow.

18744 APTIC NO. 37261

Mihori, Taku

VAPORIZER FOR PURIFICATION OF AUTOMOTIVE EXHAUST GAS. *(Jidosha no haiki gasu o joka suru suijoki no hassei). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-40046, 2p., Nov. 26, 1971. (Appl. April 1, 1969, 1 claim).*

In previously used vaporization plates for cleaning automotive exhaust gas, the heat was supplied from the cylinders. However, immediately after the initial operation of the engine or during idling, the heat is cooled quickly, especially during the winter season by the outside air. In this invention, the water spray in the exhaust pipe compartment is vaporized on the evaporation plate covering a special heating unit. The convex evaporation plate with a turned up rim fits over the box which contains electric wires and devices for the automatic switch. When the engine is started, electric current immediately starts to flow and the evaporation plate is heated. Vapor is created which cleans the exhaust gas. When the vapor plate is overheated, it expands and the center rises; the connecting piece acts as a thermostat, by cutting the contect and stopping the electric current.

18745 APTIC NO. 37407

Mitsuzaki, Nariaki

MULTICYCLONE DUST COLLECTION APPARATUS. *(Maruchikuron shujin sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(1):63-67, Jan. 1972.*

The appearance, mechanism characteristics, performance, selection, and problems in the maintenance of a multicyclone dust collection apparatus are discussed. A representative multicyclone comprises an outer shell, hopper, and cyclone tubes. The entrance and exit are divided by tube boards, forming chambers. Each cyclone comprises a single cyclone tube, a guiding vane, and an exit tube with a espirovane, a spirocone, and a tricone. The gas entering the chamber forms whirlpool guided by the vane, separates, and eliminates by centrifugal force. The dust settles into the hopper and is continuously eliminated by the dust eliminator. In order to obtain an even distribution of gas among many pipes, the tube board at the entrance is sometimes divided into several steps, and in a deep multicyclone, the hopper is divided by a board in order to prevent gas circulation. Air tight sealing of the joints of the cyclone tubes and boards or the hopper and the shell is another problem. Leakage is often the cause of insufficient dust collection. The most notable characteristic of a multicyclone is the design according to the need. Adjustments by adding or eliminating the tubes are possible even after installation, depending on the fluctuation of the treatment gas quantity. The space needed for installation is much smaller than for an ordinary cyclone. For the treatment of 100,000 cu m/hr gas, the space needed for a multicyclone is 8 sq m compared with 56 sq m of a six-unit cyclone, and the volume is 390 cu m against 690 cu m.

18746 APTIC NO. 37031

Mixon, L. W., A. I. Rozmanith, and W. T. Wotring

EFFECT OF FUEL AND LUBRICANT ADDITIVES ON EXHAUST EMISSIONS. *Preprint, Society of Automotive Engineers, Inc., New York, 23p., 1971. 4 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710295.)*

In applying additives for minimizing exhaust emissions from internal combustion engines, substantial reductions of hydrocarbon and carbon monoxide emissions were obtained only when peroxides were injected in the presence of secondary air into the exhaust gas at the exhaust port. The hydrocarbon emission reductions do not appear sufficient to justify incorporating an exhaust additive injection device in a practical emission control system. Additives incorporated in fuels for modifying combustion kinetics, or combustion chamber deposits, did not have significant effects. No significant additive effects were found on hydrocarbon emissions by using lubricants with various ash content levels. The greatest variations in exhaust hydrocarbons were due to differences among engines. Lubricant effects were small and seemed to be independent of lubricant ash content. Similarly, no significant hydrocarbon emission differences were found between a lubricant containing an ashless dispersant plus an over-based sulfonate rust inhibitor, and another, containing a metallic phosphonate detergent-dispersant and an ashless rust inhibitor. (Author summary)

18747 APTIC NO. 37283

Moinard, J.

CERCHAR EXPERIMENTAL METHOD FOR DETERMINING STACK HEIGHTS IN SITU. *(Methode experimentale CERCHAR pour la determination in situ des hauteurs de cheminees). Text in French. Pollut. Atmos. (Paris), 13(51):189-194, July-Sept. 1971.*

A simple and rapid technique for determining stack heights in situ is described which takes into consideration both the environment and the most complex meteorological conditions. It either utilizes a telescopic mast 15 m high when fully extended or a meteorological balloon which can attain a height of 150 m, carrying 500 g cans which issue various colored smokes. The height at which smoke follows a well defined upwards trajectory can be determined very accurately.

18748 APTIC NO. 37694

Moragne, Edward L.

AIR CLEANER. *(Assignee not given.) U. S. Pat. 3,596,439. 5p., Aug. 3, 1971. 6 refs. (Appl. July 2, 1969, 19 claims).*

An improved air cleaner for removing grease and oil from vapors emitted during the cooling of foods is presented. Prior systems have been very complex, expensive, and ineffective, requiring exhaustive maintenance and care. Many of the systems draw air over the cooking surface of the stove and, as a result, the grease-laden vapors are not properly ducted. The air cleaner is a self-contained system, adapted to be mounted directly over a stove or other cooking surface. The front wall of the cleaner is inclined over the cooking surface and the vapors are drawn directly into the ports formed in the front wall. The vapors are forced around baffles through filter material which remove their grease and oil content. A submersible electrically driven pump in the lower reservoir of the cleaner forces a cleaning solvent through a spray header mounted above the filters. Nozzles on the header spray the solvent to clean the filter; the solvent is retained by the baffles and is returned to the reservoir to be recirculated.

18749 APTIC NO. 36952

Moriarity, Francis C. and Max M. Fisher

HOW TO PLAN A WASTE-DISPOSAL PROGRAM IN URBAN AREAS. *Oil Gas J., 5(28):296-297, 299-301, Nov. 1952. 18 refs. (Presented at the American Petroleum Institute Division of Refining, Mid-Year Meeting, San Francisco, Calif., 1952.*

Among the problems associated with refinery waste disposal are burning of high-sulfur vapors, treatment of plant sewer water, neutralization of spent caustic and receiver waste water, and smoke abatement. Solutions to these problems include a compressor system, which continuously draws vapors from crude storage tanks, discharging them directly into a furnace where they are burned; and a Hortondome system, which has a compensating membrane to receive or discharge vapors as needed in gasoline blending operations. A caustic-neutralization system uses flue gas from a catalytic cracking unit to neutralize spent-caustic treating solutions. Waste waters from refinery receivers are treated in an analogous manner: flue gases from the cracking unit are passed through a packed tower, countercurrent to the waste waters, for removal of odorous compounds from water. An emulsion-breaking system removes oil suspended in water before the latter is discharged to sewers. Smoke requirements are met by installation of smoke indicators wherever fuel is burned in widely varying amounts.

18750 APTIC NO. 37330

Murphy, R. P., D. G. Palmer, and L. M. Ferrari

CONTROL OF CARBON MONOXIDE EMISSION FROM MOTOR VEHICLES BY CARBURETOR ADJUSTMENT. *Clean Air, 4(1):16-19, 21, April 1970. 8 refs. (Presented at the Clean Air Conference, Sydney, Australia, May 1969.)*

The influence of simple carburetor adjustment on emission concentrations is discussed. Adjustment of the carburetor was carried out by reducing the fuel supply to the engine by adjusting the idling mixture screw or jet adjusting nut, and at the same time varying engine speed to correspond approximately to the maker s recommendation. By adjusting the idling speed screw and the idling mixture screw, the air-fuel ratio was increased from a rich fuel mixture and the subsequent combustion improved to aaproach stoichiometric conditions. Where the carbon monoxide concentration exceeded 2.5%, the carburetor was adjusted. Cars were randomly selected in Sydney. Several cars were road tested.

18751 APTIC NO. 37632

Muschelknautz, Edgar

THE CALCULATION OF CYCLONE COLLECTORS FOR GASES. *(Die berechung von Zyklonabscheidern fuer Gase). Text in German. Chem. Ing. Tech., 44(1+2):63-71, Jan. 1972. 15 refs. (Presented at the Jahrestreffen der Verfahrens-Ingenieure, Nuermberg, West Germany, Sept. 21-23, 1971.)*

A review is given concerning the mathematical calculation of cyclones for waste gas cleaning. Through better knowledge of the flow and dust movement in the cyclone an accurate calculation of the pressure loss and the collection efficiency for all dust loads and gas conditions is possible. The influences of the inlet narrowing or braking effect, of the wall friction and the particle- air drag, and of the momentum losses in the immersion tube are separately determined. The collection is divided into that one along the curved inlet path and the one caused by the rotary movement. The various cyclones can be characterized by dimensionless normal parameters which were derived in an earlier paper. With a special computer program, the cyclone best suitable for a certain purpose can be found. At any theoretical calculation the most essential practical viewpoints must be taken into consideration.

18752 APTIC NO. 37751

Nakamura, Harutoki

PROCESS FOR THE PRODUCTION OF A CATALYST FOR THE DETOXICATION OF AUTOMOBILE EXHAUST GASES. *(Verfahren zum Herstellen eines Katalysators zum Entgiften von Autoabgasen). Text in German. (Matsushita Electric Industrial Co., Ltd., Osaka (Japan)) W. Ger. Pat. 2,062,056. 19p., Aug. 12, 1971. (Appl. Dec. 16, 1970, 6 claims).*

The proposed catalyst is a coating of cobalt nitrate or acetate, of a combination of 100 parts of a cobalt salt with 60 parts of a chromium salt, of 100 parts of a cobalt salt with 60 parts of a copper salt, or of 100 parts of a cobalt salt with 60 parts of a mixture of chromium and copper salts applied to a tube woven of glass fiber threads by immersion for several hours in a solution of one of the above combinations. The tube is subsequently dried and the metallic salts are decomposed to oxides at 400 C in a reducing atmosphere. The addition to the solution of a small amount of an organic chromium salt as a bonding agent will produce a catalyst of 10-30% higher catalytic activity. The catalytic activity of cobalt oxide for the oxidation of carbon monoxide and hydrocarbons to carbon dioxide begins at 90-100 C, that of the cobalt oxide-chromium oxide combination at 85 C. The woven glass fiber sleeve with the catalyst covers a cylinder made of a mesh of stainless steel threads which are connected to the automobile tailpipe. An air pump inserted between the tail pipe and the afterburner mixes the exhaust gas with additional air which supplies the oxygen for the combustion of CO and hydrocarbons to CO2. The catalyst offers practically no resistance to the exhaust gases, it is cheap, easy to produce, and oxidizes a great volume of exhaust gases.

18753 APTIC NO. 37375

Nelson, Henry O.

GASEOUS FLOW SEPARATOR. *(Assignee not given.) U. S. Pat. 3,564,820. 4p., Feb. 23, 1971. 11 refs. (Appl. April 2, 1969, 1 claim).*

The problem of entrapping and removing particulate matter from a gaseous flow is particularly acute in the air inlet of gas turbine aircraft engines where the introduction of foreign matter can cause a thrust reduction to the extent of creating a stall condition of the aircraft, as well as causiing serious structural damage to the engine parts. Several different approaches have been proposed to solve this problem. One method has been to remove the particulate matter by centrifugal force, but this approach has only been successful where the volume of air is relatively small. Another approach has been to provide a reverse flow of the air inlet but this has limited results at low aircraft speeds. Fine screens have been used but they require frequent cleaning and replacement. A gaseous flow separator is presented which comprises a plurality of spaced filter elements that intercept substantially the entire cross sectional area of the flow without restricting it. Each filter element is capable of entrapping the particulate matter and conducting it downward out of the path of the flow for disposal. Downward flow of the particulate matter is achieved by a series of horizontal baffles or by inclining the filter elements with respect to the flow.

18754 APTIC NO. 37625

Nelson Laurence N.

FUME HOOD. *(Kewaunee Scientific Equipment Corp., Adrian, Mich.) U. S. Pat. 3,604,333. 10p., Sept. 14, 1971. 3 refs. (Appl. Nov. 5, 1969, 12 claims).*

A fume hood structure is described which employs laterally movable closure members in conjunction with an auxiliary air duct arranged to discharge air to the exterior of the fume hood adjacent the closure members, as well as to provide a flow of air into the fume hood above the closure members. Control of the amount of air discharged at the exterior of the fume hood is effected by a plurality of valve or damper members operatively connected to closure members for actuation. The present construction provides all the advantages of prior devices utilizing vertically movable closure members, and at the same time provides an exceedingly simple and foolproof arrangement whereby lateral movement of the closure members will automatically provide the right amount of auxiliary air at the desired location.

18755 APTIC NO. 37626

Nesbitt, John D. and Klaus H. Hemsath

GAS-TREATING APPARATUS. *(Midland-Ross Corp., Toledo, Ohio) U. S. Pat. 3,607,120. 8p., Sept. 21, 1971. 5 refs. (Appl. Sept. 29, 1969, 22 claims).*

Gas mixing and treating devices capable of treating large volumes of gas are particularly useful in drying and other heat processing operations. One use is in fume incinerators in which a small quantity of gaseous fuel is burned and mixed with a large quantity of exhaust fumes or waste gases containing a low concentration of combustible material and sufficient oxygen to complete combustion. Previous gas mixing devices generally involve complex means for dispersing one gas throughout another by means of turbulence. An improved gas treating apparatus is described for causing a nonhomogeneous stream of gases to flow through a casing and to become homogeneously mixed in a relatively short span of time and space. A baffle extends laterally from the inner surface of the casing partially across the casing so that the outside streamlines of the forward flow do not attach readily to the inner surface of the casing. The inner edge of the baffle defines an opening which has an area and shape that correspond with the cross-sectional area and shape of the casing. (Author abstract modified)

18756 APTIC NO. 37418

Niklasson, Rune

TECHNIQUE FOR ENVIRONMENTAL PROTECTION - REVIEW ON METHODS AND DEVICES. *(Teknik for miljovard - oversikt over metoder och apparatur). Text in Swedish. Kem. Tidskr., 83(12):24-30, 1971.*

A general description of environmental pollution and of different pollution control techniques and equipment is given. In air pollution, local emissions give rise to diluted pollutants. Electrostatic filters, bag filters, and wet dust separators such as scrubbers are used for dust separation. Scrubbers are also used in gas cleaning. Dynamic separators exploiting the centrifugal force, such as cyclones and multicyclones, are applied to the separation of course dust particles. To control and measure the function and the efficiency of pollution control methods and devices, test methods and instruments are required. There are instruments for the infrared analysis of carbon dioxide as a combustion product for carbon determination. For the analysis of sulfur dioxide and other gases in concentrations of 1 cu cm/cu dm, infrared methods can be used. Wet chemical, colorimetric, and conductivity methods are applicable for concentrations of 10-100 cu cm/cu m. Chemiluminescent methods can be applied to a minimum concentration of 0.003 cu cm/cu m. Air-borne dust can be measured by radioactive isotopes, as reductions in the radiation intensity are in proportion to the dust concentration. There are instruments available for the combined determination of concentration, particle size, and size distribution. For gases, highly poisonous in low concentrations, alarm devices are required. Tables reviewing a series of air pollution control devices manufactured in Sweden are included.

18757 APTIC NO. 37611

Nutter, Raymond W. and Frederick M. Sitter

GAS SCRUBBER. *(Van-Air, Inc., Erie, Pa.) U. S. Pat. 3,596,440. 7p., Aug. 3, 1971. 10 refs. (Appl. May 14, 1969, 8 claims).*

An air or gas filter (scrubber) adapted for disposal downstream from an air or gas compressor, for removing hydrocarbons from the compressed air or gas stream is presented. The scrubber comprises an enclosure containing an elastic bed of curled fibrous material of generally open pore nature through which the compressed air or gas passes. The bed scrubs the stream and soaks up and retains hydrocarbons, dirt, and other contaminants. The contaminant solution drains from the bed into a drain provided for that purpose. The bed material may have a bulk density of approximately 12-22 lb/cu ft and results in very little pressure drop through the mechanism. (Author abstract modified)

18758 APTIC NO. 37265

Oberdorfer, Paul E., Jr.

MOTOR VEHICLE EMISSION CONTROL SYSTEM. *(Sun Oil Co., Philadelphia, Pa.) U. S. Pat. 3,599,426. 6p., Aug. 17, 1971. 4 refs. (Appl. May 18, 1970, 9 claims).*

Motor vehicle exhaust emissions of oxides of nitrogen, carbon monoxide, hydrocarbons, and aldehydes can be reduced under off idle operating conditions by a combination of enrichment of the fuel-air mixture fed to the engine, and a thermal exhaust reactor. The enrichment is brought about by a mechanical modification of the carburetor, while a selective carburetor control arrangement responsive to engine speed is utilized for producing a lean fuel air mixture at higher engine speeds. (Author abstract modified)

18759 APTIC NO. 37587

Ochs, Hans-Joachim

SAND BLASTING STATION WITH AIR RECIRCULATION. *(Sandstrahlerei mit Umluftbetrieb). Text in German. Wasser Luft Betrieb, 16(2):58-60, Feb. 1972. 4 refs.*

The waste air of an iron-sand blasting unit is cleaned in a cloth filter with an electromotoric rapping device for cleaning the filter. The dust-laden air is first passed into a chamber for preliminary dust separation by reduction of the flow speed and by sudden deflection of the air flow. The finer dust particles are then separated in the cloth filter, to which they are drawn by an exhauster. The total collection efficiency of the two-stage collector is 99%, leaving a residual dust concentration of 20 to 30 mg/cu m in the cleaned gas flow. For further reduction of the dust concentration to 0.5 mg dust/cu m, the air flow is passed to two parallel large-size oil bath air filters. Oil particles and dust laden air are brought in close contact by guide vanes which impart a rotary movement on the flow. Dust and oil particles are precipitated in the filter cartridges. The collection efficiency is more than 99%. For collection of the remaining small particles of 1 micron, the air flow is passed to a last filtering stage consisting of 60 filter packs. Afterwards it can be returned into the workshop hall as fresh air.

18760 APTIC NO. 37234

Oelert, Henning H.

GASOLINE WITHOUT LEAD. TECHNICAL AND HYGIENIC ASPECTS OF LEAD EMISSION BY OTTO ENGINES. *(Benzin ohne Blei. Technische und hygienische Aspekte der Bleiemission von Ottomotoren). Text in German. Umwelt (Duesseldorf), 1(6):36-39, Dec. 1971.*

The lead emitted by automobiles produces emissions which are clearly below the maximum allowable concentration. To date, no physical damages on humans through the lead emission into street air are known. However, not much is known yet about long-term effects. The law in the Federal Republic of Germany requires a reduction of the lead content in gasoline to 0.4 g/l beginning in 1972 and to 0.15 g/l in 1976. Lead-free and low-lead gasolines with sufficient octane number can be produced by familiar methods with an acceptable cost increase. The operation with lead-free gasoline has a general emission preventing effect. Damages on the engine were observed only in rare cases. Lower lead emissions improve the possibility for catalytic afterburning. Tests with lead-free fuel which contained 60 to 80% paraffin showed that the hydrocarbon concentration in the exhaust gas was slightly raised. The fuel composition had no influence on the emitted concentration of polycyclic aromatics. The quantity of polynuclear hydrocarbons emitted is determined by the air/fuel ratio and the rpm. In the future all efforts will be directed toward a reduction of the hydrocarbon emissions to zero. Catalytic afterburning reduces the carcinogenic polynuclear aromatics by 90% even after longer operating times.

18761 APTIC NO. 37676

Onizuka, Shigenori, Yasumi Kamino, Yoshizo Matsushita, and Masaaki Miyaji

DESULFURIZATION OF FLUE GAS BY ACTIVATED CARBON. FOURTH REPORT. CAPACITY VARIANCE OF ACTIVATED CARBON IN CONTINUOUS OPERATION. *(Sojoki datsuryushiki kasseitan ni yoru haien datsuryu (daiyonpo). Renzoku unten ni yoru kasseitan no seino henka). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 236, 1971. (Presented at the Japan Chemical Society, Fall Meeting, 25th, Osaka, Japan, Oct. 11-14, 1971.)*

Sulfur dioxide in 1200 n cu m/hr of stack gas was adsorbed by activated carbon for 1200 continuous hr and the adsorption capacity change was observed. The desulfurization rate deteriorated. The physical and chemical property changes of the activated carbon were examined in order to clarify the relationship between the changes and the SO_2 adsorption capacity. The physical property of the carbon actually improved during the treatment in steam at 300 C in the separation tower, which increased the porous structure. Therefore, the adsorption capacity had nothing to do with the physical property change. The component of the activated carbon was mainly oxygen (except for carbon) and most oxygen existed in the form of surface oxide. The oxygen content in the carbon increased in proportion to the operating time; after 1200 hr of operation on the initial content of the activated carbon was doubled when it was fresh. The adsorption capacity and the oxygen content had a minus linear relation. The longer the operating time, the less basic radical formation and more acidic radical formation appeared. The activity of the coal had a linear proportionate relationship with the basic radical quantity. The most basic radical was formed when carbon was treated in the high temperature of 800 C, and the most acidic radical was formed when it was treated in the presence of oxygen at approximately 300 to 400 C.

18762 APTIC NO. 37557

Otake, Kazutomo and Yasuo Hara

BEHAVIOR OF NITROGEN OXIDES IN MHD PLANT (REPORT NO. 1). *(MHD hatsuden puranto ni okeru chisso sankabutsu no kyodo). Text in Japanese. Preprint, Association of Safety Engineering (Japan), p. 73-76, 1971. 5 refs. (Presented at the Association of Safety Engineering, Technical Meeting, 4th, Tokyo, Japan, Dec. 9-10, 1971.)*

As a basic study for an improvement of high combustion performance with less amount of nitrogen oxides emission, the behavior of nitrogen oxides was studied at a power plant which uses a combustion type MHD (magnetohydrodynamic) motor and steam power system. Calculations were made with regard to the transformation of concentration indexes of elements such as nitric oxide, nitrogen dioxide, nitrate, nitrite, and nitrogen from the time they are created in the combustor until they are emitted from the stack. Nine formulas were used for the gaseous reaction, and one was used for the surface reaction of nitric oxygen on the surface of alumina. A diagram indicating time transitions and the pattern of molecular ratios and the figures of elements at the entrances and exits of various apparatuses is presented. Three operating variables were (1) phase 1 first combustion, (2) after phase 1.2 combustion, NO was decreased and air was added at the MHD motor exit and a secondary combustion was given at phase 0.9, (3) using a similar procedure to (2), the secondary combustion was given at the exits of the fixed air heater. The amount of NO in each case was 1000 ppm for (1), 460 ppm for (2), and 2100 ppm for (3).

18763 APTIC NO. 37088

Paust, Stanley S.

AIR POLLUTION AND METHYLAMINES. *Ind. Water Wastes, 6(5):158-161, Sept.-Oct. 1961.*

Pollution control and public relations at an amine manufacturing plant are discussed. Methylamines are manufactured by the reaction of ammonia with methanol over a dehydrating catalyst at temperatures in the range of 300-500 C. Mono, di-, and trimethylamines are low boilers and are highly volatile, developing relatively high vapor pressures under normal conditions. In addition to their objectionable odor, the methylamines are irritating gases. Exposures to very high concentrations may stop breathing and cause enough damage to the respiratory tract and lungs to be fatal. Installation of a complete ventilating system which will exhaust air from the methylamines building once each five minutes is proposed, in addition to keeping the building under a slight negative pressure to eliminate leakage to the surrounding atmosphere. Air will be scrubbed free of its methylamine content with 5% sulfuric acid.

18764 APTIC NO. 37541

Panzarella, John E.

RECOVERY OF CHEMICALS FROM OFF-GASES. *(Dow Chemical Co., Midland, Mich.) U. S. Pat. 3,589,104. 4p., June 29, 1971. 2 refs. (Appl. June 26, 1969, 10 claims).*

The most common expedients employed for recovering valuable chemicals and deleterious air polluting off-gases are carbon adsorption and compression-decompression with or without cooling. These processes are expensive and require large facilities, and equipment blockage due to solids formation is common when cooling is employed and water is present. In the present invention, a chemical process off-gas is introduced into a zone which is maintained at a temperature below the condensation temperature of the condensible chemicals to be removed. This zone is provided with a film on its walls of a water-miscible liquid which remains liquid at the operating temperature of the zone and which is preferably condensate immiscible. The condensate is separated from the noncondensible gases after leaving the zone. The noncondensable gases are vented to the atmosphere, and the water and water-miscible liquid are separated from the condensate. Then, the water-miscible liquid is concentrated by removal of water, and the concentrate is returned to the zone to establish and maintain the film. The remainder of the condensate which contains the valuable chemicals and pollutants is then collected.

18765 APTIC NO. 37615

Peterson, Donald A.

AIR FILTER. *(Assignee not given.) U. S. Pat. 3,606,739. 6p., Sept. 21, 1971. 9 refs. (Appl. July 10, 1969, 8 claims).*

An air filter is described which provides a single length of material formed into a plurality of individual bags which present a number of filtering surfaces to the air to be filtered and which are secured to an integral frame. The integral frame supports the filtering medium within the housing and permits the unitary filtering medium to be easily inserted into the filter's housing, thereby eliminating the need of stuffing the individual bags into the housing of the filter.

18766 APTIC NO. 37395

Petrilli, Fernando

POSSIBILITIES OF AIR POLLUTION PREVENTION. *(Possibilita di prevenzione dell inquinamento atmosferico). Text in Italian. Audiotecnica News, no. 1-6:121-134, Jan.-Dec. 1971. (Presented at the Congresso Nazionale per la lotta contro fumi e rumori, Genova-Nervi, Italy, 1958.)*

Air pollution from domestic heating plants can be reduced by choosing less polluting fuels, by improving the functioning of furnaces, or by better dispersion of combustion products. The first alternative implies the use of coke or of natural gas, the second implies inspection of furnaces and changeover to larger and more efficient central heating plants. Exhaust gases from motorcycles contain 7% carbon monoxide against 2.5% CO in automobile exhaust gases. Reduction of these pollutants would require driver education and improved engine maintenance. Modifications in fuel types are still in an experimental stage; a drastic but effective measure is a limitation of automotive traffic; in tunnels good ventilation is mandatory; regulation of traffic flow, so that stopping is minimized, will also minimize air pollution. In industry, the replacement of coal with liquid fuels is one way of reducing pollution, the introduction of purification plants is another. The various devices in use include gravity settling chambers, electrostatic precipitators, centrifugal separators, various types of filters, and various types of scrubbers for the purification of particulates and of gases; the combined action of a venturi scrubber and a cyclone is especially effective and frequently used. Gaseous pollutants can be eliminated by combustion, absorption, or adsorption. The first method is used in the petroleum, varnish, fertilizer, and other industries. Absorption is most often used in the case of sulfur dioxide and is sometimes combined with the recovery of sulfur. Other means of reducing air pollution are a separation of residential from industrial zones, rational zoning regulations, the establishment of green belts, the building of mass transit facilities, and appropriate Clean Air legislation.

18767 APTIC NO. 37489

Pich, Josef

PRESSURE CHARACTERISTICS OF FIBROUS AEROSOL FILTERS. *J. Colloid Interface Sci., 37(4):912-917, Dec. 1971. 15 refs.*

The gas flow in fibrous aerosol filters has a basic significance for the determination fo filtration parameters E (efficiency of the filter) and delta p (pressure drop of the filter). Dimensionless equations describing pressure-drop reduction in fiber filters with decreasing gas pressure were derived from theoretical equations for the pressure drop of high-porosity fibrous aerosol filters at low-speed Newtonian flow. The theoretical equations were used to analyze the dependence of pressure drop on gas pressure over the whole range of Knudsen numbers. The dimensionless equations, which were checked against available experimental data, indicate that the pressure-drop rcduction is dependent on three factors: character of flow through a filter a normal pressure (continuum, slip, transient, and free molecule flow); dilution (reduction of gas pressure); and filter porosity.

18768 APTIC NO. 37509

Predikant, Hans H., Hermann Betz, and Johann Schaeffer

METHOD AND DEVICE FOR CLEANING INDUSTRIAL WASTE GASES. *(Verfahren und Vorrichtung zur Reinigung von Industrieabgasen). Text in German. (UOP-Kavag, Gesellschaft fuer Luftreinhaltung m.b.H., Gondsroth bei Frankfurt am Main (West Germany)) W. Ger. Pat. 1,905,080. 15p., Aug. 13, 1970. (Appl. Feb. 1, 1969, 7 claims).*

A new method and equipment for cleaning industrial waste gases containing fluorine and/or hydrofluoric acid are described. The waste gases are scrubbed with aeqeous hydrofluoric acid in a first scrubbing zone and with sodium lye in a second scrubbing zone. The run-off from the first scrubbing zone is recirculated to the first scrubbing zone until the hydrogen fluoride concentration has risen to between 3 and 5% by weight. The run-off from the second scrubbing zone is recirculated to the second zone for enrichment of the sodium fluoride. The two run-offs from both scrubbing zones are combined in a neutralization zone; the precipitated sodium fluoride is separated, and the base lye is returned from the neutralization zone to the first scrubbing zone. The two scrubbing zones are arranged above each other in a column. Water is injected into the first scrubbing zone in proportion to the volume reduction of the scrubbing fluid. Each scrubbing zone has its own entrance and exit. The run-off from the two zones is collected in containers with return connections to the respective scrubbing zones.

18769 APTIC NO. 37448

Puhr-Westerheide, Hans

DEVELOPMENTS FOR MORE ECONOMIC POWER PRODUCTION FROM COAL. *(Entwicklungen fuer eine wirtschaftlichere Energieerzeugung aus Kohle). Text in German. Glueckauf (Essen), 108(2):73-75, Jan. 20, 1972.*

Two new methods for power production based on coal are discussed: the fluid-bed method, and the coal-pressure-gasification method. Both methods have advantages over conventional power plants as far as desulfurization of wast gases is concerned. In conventional power plants, desulfurization of flue gases prior to discharge into the atmosphere is feasible only at great expense. Simpler solutions are available for the two new methods. In the fluid-bed method, ground limestone is added to the fluid bed. The sulfur is bound in the fluid bed and the loaded additive is discharged with the ash. It is expected that a degree of desulfurization of up to 90% can be achieved with this method. In coal-pressu e- gasification, the hydrogen sulfide can be removed from the gas prior to combustion. Laboratory experiments have shown that the hot-potash-method is very suitable for this purpose. The pressurized gas is passed through a cooler-saturizer system. Preliminary scrubbing of the gas is carried out in the cooler, the actual desulfurization then takes place in the absorber containing a potash solution. In the saturizer, the gas is heated again countercurrently to 150 C. Elemental sulfur is produced from the absorbed gas in a Claus furnace. A degree of desulfurization of 90% is feasible. An experimental plant for desulfurization of 3500 cu m/hr will be erected in the power plant Kellermann. The waste gases from the combined desulfurization/pressure gasification process are entirely dust free.

18770 APTIC NO. 37326

Rich, Theodore A. and James N. Grooves

AIR FILTER SYSTEM. *(General Electric Co.) U. S. Pat. 3,599,401. 6p., Aug. 17, 1971. 14 refs. (Appl. March 14, 1966, 1 claim).*

The high flow rates at which many filters for homes and buildings must be operated not only cause noise and drafts but a loss of filter efficiency in normal room air. Moreover, most filter systems incorporate unidirectional airflow and require motors, fans, and ducting to move air. A compact new system filters large volumes of air at relatively slow velocities to provide highly effective filtration without drafts and air noises. The system comprises an expansible chamber closed on at least one side by a filter and on another side by a movable wall, which constantly varies the chamber volume between a maximum and a minimum. As the volume increases, air is pulled through the filter into the chamber; when the volume decreases, air is pushed back through the filter to provide a double-filtering action. The system can be housed in walls, room dividers, or furniture.

18771 APTIC NO. 37011

Richmond, James T.

DISPOSAL OF WASTE ACID WITH SPECIAL REFERENCE TO WASTE SULPHURIC ACID. *Society* *of Chemical Industry, London (England), Disposal Ind. Waste Mat. Conf., Sheffield (England), 1956, p. 113-118. 43 refs. (April 17-19.)*

The use of sulfuric acid in industry and methods for its disposal are considered. Superphosphate, ammonium sulfate, rayon, titanium oxide, iron pickling, dyestuffs and intermediates, hydrochloric acid, and oil refining are sources of waste acid. Disposal methods are broadly classified as discharge without treatment, discharge after preliminary treatment involving neutralization, and recovery of useful acid or by-products. The cheapest alkaline material normally available for neutralization is limestone or chalk although the use of waste sludges from lime soda softening plants or waste carbide from acetylene generating units has been proposed.

18772 APTIC NO. 37559

Richter, L. A., J. G. Koslow, and E. I. Gawrilow

EFFECT OF AERODYNAMIC FACTORS ON THE SEPARATION CAPACITY OF ELECTRIC DUST COLLECTORS. *(Der Einfluss aerodynamischer Faktoren auf die Abscheideleistung bei Elektroabscheidern. Text in German. Luft Kaeltetech., 6(5):227-230, Oct. 1970. 5 refs.*

When the velocity field is known, characteristic properties of electric dust collectors during flue-gas flow can be used to establish the dust content of the cleaned gas. A gas-distribution device placed in the inlet of the electric separator and providing a uniform flow distribution within the cross-sectional area of the gas inlet is recommended.

18773 APTIC NO. 37316

Riedlinger, Rudolf A.

THE CONTRIBUTION OF REMOTE HEAT TO THE PROTECTION OF THE ENVIRONMENT. *(Der Beitrag der Fernwaerme zum Umweltschutz). Text in German. Energie (Munich), 23(11):337-339, Nov. 1971.*

Individual domestic heaters fired with coal emit carbon monoxide, carbon dioxide, sulfur dioxide, and dust. Oil-fired individual home heaters emit CO2 and SO2, no dust, and CO. Heaters which serve one floor of apartment houses or an entire apartment house usually emit less than individual heaters, since coke, gas, or oil is used as the fuel. Heating systems which supply an entire block with heat emit even less, due to a more favorable mode of operation. But all these systems have the disadvantage that the heating system is located in the midst of the residential area and that the stacks are hardly higher than the houses. Remote heat supply plants have the advantage that they discharge their waste gases through high stacks. The waste gases are better diluted. Moreover, remote heating plants can be erected outside of residential areas. For further reduction of the emissions in a city, the waste gas from refuse combustion can be utilized for remote heating. A combination of remote heating with refuse incineration may reduce the emissions by as much as 10% over those at separate remote heating and refuse incineration.

18774 APTIC NO. 37553

Rikhter, L. A., I. B. Zasedatelev, and F. P. Duzhikh

INCREASING THE RELIABILITY OF LARGE THERMAL POWER STATION CHIMNEYS. *Thermal Eng. (English translation from Russian of: Teploenergetika), 18(3):103-106, March 1971. 4 refs.*

Corrosion problems associated with four types of single-flue chimneys installed at large Soviet thermal power stations are discussed. The chimney types are reinforced concrete with ceramic linings (I); metal chimneys made of individual thermally insulated sheet-steel cylinders (II); reinforced concrete with metal flues for thermal insulation (III); and reinforced concrete with ventilated clearance between the flue and the lining (IV). The best results were obtained with type IV provided the ventilation was forced and a static pressure existed in the clearance. Under these conditions, there is no gas flow toward the supporting reinforced concrete shaft and thus no corrosion of the later. However, the requirement of a minimum of two fans with electrical drives and a reserve power supply make type IV chimneys with forced ventilation more expensive. As a solution, a new type of reinforced concrete chimney is proposed, one that is pressurized in a naturally ventilated clearance of variable width between the reinforced concrete shaft and an acid-resistant lining. The new design should increase the reliability of chimneys for high-capacity thermal power plants.

18775 APTIC NO. 37432

Roscoe, John D.

SAFETY SHIELD FOR A FUME-COLLECTING APPARATUS. *(Bethlehem Steel Corp.) U. S. Pat. 3,580,556. 3p., May 25, 1971. 2 refs. (Appl. April 18, 1968, 2 claims).*

With a basic oxygen furnace having a fume collecting hood located above its opening, agitation within the furnace causes additional slag matter to be splashed on and into the hood. A safety shield can be placed and secured under the fume collecting apparatus when the furnace is not operating, thereby preventing slag accumulated within and on the apparatus during furnace operation from falling upon workmen. The shield also allows repair of the furnace while the slag is being scraped off the fume collecting apparatus above it. (Author abstract modified)

18776 APTIC NO. 37475

Rychkov, V. P. and L. A. Zhestkov

INCREASE IN THE OPERATING EFFICIENCY OF ELECTROSTATIC PRECIPITATORS. *0(Povysheniye effektivnosti raboty elektrofil trov) Text in Russian. Energetik (Moscow), no. 6:17-18, 1971.*

The performance of electrostatic precipitators in substantially increased by conditioning the exhaust gases from electric or open-hearth furnaces with a relatively small amount of ammonium sulfate (e.g., 20 kg/150,000 cu m/hr of treated gas) prior to their dedusting. The increase is due to the presence of the products of the thermal dissociation of (NH4)2SO4 (greater than 500 deg), which brings about a decrease in the electrical resistance of the dust layer deposited on precipitating electrodes.

18777 APTIC NO. 37341

Schlueter, H.

REDUCTION OF ALKALI AND CHLORINE CYCLES IN THE SUSPENSION PREHEATER KILN. *(Verfahren zur Reduzierung von Alkali- und Chlorkreislaeufen in Rohmehlwaermetauscheroefen). Text in German. Zement-Kalk-Gips Wiesbaden), 25(1):20-22, Jan. 1972. (Presented at the VDZ-Kongress, Verfahrenstechnik der Zementherstellung, Duesseldorf, West Germany, Sept. 9-Oct. 10, 1971.)*

Coatings and clogging phenomena in suspension preheaters are mainly caused if the raw material contains a high proportion of volatile alkalies which can form a major dust cycle in the kiln system. Measures can be taken which prevent the alkali-particles from penetrating deep into the heat exchanger. If a clinker with low alkaline concentration is needed however, the only solution is provided by the installation of a bypass, i.e., part of the waste gas is drawn off and cleaned. The bypass has two disadvantages: the dust collection of the gases is difficult and so is the treatment of dusts which are to be removed from the process. By passing the extracted waste gases into a preliminary cyclone these problems are partly solved. The dust concentration retained in the preliminary cyclone depends on the grain size distribution of the dust and the collection efficiency of the cyclone. The cyclone efficiency can be varied by controlling the entrance speed into the cyclone. If the branched-off gas volume is increased from 5 to 7% about 80% of the dust can be re-used and only 20% must be discarded.

18778 APTIC NO. 37750

Schulz, Ulrich and Ulf Richter

INFLUENCE OF TECHNOLOGICAL FACTORS ON THE DEGREE OF SEPARATION OF ELECTRIC FILTERS IN NON-FERROUS METALLURGY. *(Einfluss technologischer Parameter auf den Abscheidegrad von Elektrofiltern in der NE-Metallurgie). Text in German. Neue Huette, 16(7):385-390, July 1971. 13 refs.*

The flying dust generated in non-ferrous metallurgical furnaces is mostly composed of oxidized particles of zinc, lead, tin, antimony, and arsenic. Sheet-type filters and electrostatic precipitators are used for removal and recovery of these dust types. Due to the generally high specific electric resistance of the dust, the process can be carried out effectively only by adhering to certain values of precipitation temperature and water content of the gas phase. To establish design parameters for the construction of precipitators for the non-ferrous metal industry, the precipitation rate of waste gases derived from various metallurgical furnaces for copper, zinc, tin, and lead was measured by a laboratory-type electrostatic precipitator. The influence of precipitation temperature and water content of the gas phase on the precipitation rate was investigated. The results of measurements of precipitation rates and electric resistance of the separated dust material, in combination with theoretical considerations, lead to the conclusion that with dust of a specific electric resistance of less than 10 to the 10th ohm cm, the precipitation rate is influenced by temperature, dew point of gas, viscosity of gas, and voltage of electric field, independent of the specific electric resistance of the dust. Above 10 to the 10th and up to 10 to the 11th ohm cm, the precipitation rate is related to the specific electric resistance of the dust.

18779 APTIC NO. 37299

Schuraytz, I. M. and E. S. Kopecki

STAINLESS STEEL USE IN SLUDGE INCINERATOR GAS SCRUBBERS. *Public Works, 103(2):55-57, Feb. 1972.*

In the first stage of a 30-year expansion program, Detroit will increase its primary waste-water primary treatment capacity by 32% and install six new multiple-hearth sludge incinerators. To minimize air pollution, the incinerators will be equipped with impingement-type scrubbers capable of removing 99% of the fly ash in the 5-25 micron range. To minimize corrosion caused by cooling-water and exhaust-gas components, the scrubbers will be entirely of low-carbon Type 316L stainless steel. The choice of this stainless steel was based on 10 years of material evaluation.

18780 APTIC NO. 37251

Schwab, Georg-Maria and Guenter Donga

CARRIER CATALYST AND PROCESS FOR ITS MANUFACTURING. *(Traegerkatalysator und Verfahren zu dessen Herstellung). Text in German. (Assignee not given..) W. Ger. Pat. 2,010,449. 13p., Sept. 23, 1971. (Appl. March 5, 1970, 9 claims).*

The carrier catalyst is applied to the cleaning of exhaust gases from internal combustion engines and gases containing carbon monoxide and/or hydrocarbons. The carrier is made of alpha and gamma aluminum oxide, aluminum silicates, or magnesium oxide. The active mass consists of copper oxide and manganese oxide in ratios of 2:1 to 1:2, and may contain oxides of iron, silver, cobalt, and/or lead, silicon, and one or more oxides of titanium, zirconium, or thorium as promotors. The promotor oxides lie in a range of 1-15 molar percent, preferably of 6-12 molar percent. The active mass also contains oxides of sodium, potassium, or barium in amounts of 1-10 atom percent, preferably of 6-7 atom percent relative to the metals in the active mass. The promotor oxides are applied together with the active mass on the hard, highly porous carrier. The promotor oxides and the oxides of the active mass are applied on the carrier in the form of their decomposable salts by calcination. The promotor oxides are applied chiefly in nitrates, and the calcination can be made in the reducing atmosphere. The catalyst thus obtained allows lower catalysis temperatures and quantitative combustion of hydrocarbons.

18781 APTIC NO. 37459

Schweiger, Axel

DUST COLLECTION AUTOMATIZED. *(Entstaubung automatisiert). Text in German. Technische Umweltmag., no. 1:30-31, Feb. 1972.*

Dust develops primarily during the crushing and shredding as well as at the sifting of material. Machine-treatment of various materials such as iron, metal, wood, and synthetics also produces dust. The developing dusts differ widely from each other. Three basic types can be distinguished: toxic dusts, re-usable dusts, and dusts destructive to machine parts. An example for the latter group is cast iron dust which develops during drilling or polishing and which deposits on bearings. Re-usable dust develops during the treatment of expensive metals (e.g., brass). Toxic dusts may be re-usable at the same time. All dust removal systems aim at drawing-off the dust at the point of origin. For dust separation, cyclones, multi-cyclones, wet collectors, cloth filters, and electrostatic precipitators are used nowadays. The suitability of the various systems depends on the type and quantity of dust, on the desired collection efficiency, and on the investment and operating costs. A high collection efficiency is achieved with cloth filters (99.9%). The various types of cloth filter such as tubular and envelope-type of filters are briefly reviewed, as well as the cleaning mechanism.

18782 APTIC NO. 37062

Seaver, J. J.

AIR POLLUTION AND REMEDIES. *Iron Steel Engr., 30(10):94-95, Oct. 1953.*

Much natural air pollution is caused by wind blowing dust and other light solids randomly over large areas. However, the wind is usually preceded or followed by a rain which increases the specific gravity of the dust particles, thus cleansing the air. Exhaust fumes from gasoline engines using plain gasoline have been successfully neutralized, and new catalysts may be developed for cleaning up the fumes which contain lead. Experiments have been carried out at a hot slag granulating pit to counteract sulfur odors generated in the production of expanded slag. City streets and most main highways, once a great source of dust, have been paved. Many industrial plants having dust, fume, and odor release problems have built very high chimneys or draft stacks.

18783 APTIC NO. 37427

Sefcik, Andrew J.

SUPPORT FOR INCLINED FUME HOOD. *(Combustion Engineering, Inc., Windsor, Conn.) U. S. Pat. 3,575,142. 5p., April 20, 1971. 4 refs. (Appl. July 1, 1969, 6 claims).*

The basic oxygen steelmaking process cycle includes charging of the converter vessel, a cycle time in which oxygen is blown into the converter vessel, and tapping of the molten steel from the converter. In view of the large cyclic temperature variations and the resulting thermal movement, supporting and maintaining the positioning of the inclined fume hood and the related fluid supply system present unique problems. A strongback support composed of I-beams is located beneath the inclined fume hood and is fixed to the hood at the upper end of the incline. The hood is supported by the strongback on bearing surfaces interposed between the hood and the I-beams to permit relative movement in between in order to compensate for the thermal movements of the hood.

18784 APTIC NO. 37126

Selheimer, C. W. and Charles Henry Borchers

EVALUATION OF MULTI-WASH COLLECTORS IN SUPPRESSION OF PAINT INDUSTRY FUMES. *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(384):684-709, Aug. 1954. 9 refs.*

Evaluation of a Schneible Multi-Wash Collector system used in the elimination of fumes from certain cooking operations in a paint and varnish plant was concerned with performance, construction, operational details, maintenance costs, means of increasing performance, and safety of operation of the unit tested. The chemical nature of the compounds in the fumes which cause the odor problem, the chemical composition of the raw fumes, and the gases released to the atmosphere were determined by infrared and mass spectrometry. The performance of the Multi-Wash Collector system was in the range of 95 to 99% removal of nuisance materials. The water spray leg does 85 to 88% of the work in controlling process fumes. Although the dilution of the gases entering the collector by the large volume of air being bled into it would normally raise its apparent efficiency close to 100% the fact that this does not occur indicates that fumes washed from the same cooking process during the maximum evolution period or coming from the other two ulti-Wash Collectors are being re-liberated. The equipment is limited to removal of fumes condensed by or dissolved in the wash water, but does not and cannot remove the major odor-producing gases.

18785 APTIC NO. 37127

Selheimer, C. W., Roland Armani, and Henry Jurczak

USE OF ACTIVATED CARBON TO ADSORB FUMES FROM PAINT AND VARNISH INDUSTRY COOKING OPERATIONS. *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):629-643, Aug. 1954. 4 refs.*

Four types of activated carbon were tested to the saturation point or break-through of fumes from esterification of tall oil with glycerine. The break-through point was determined by odor alone. Equipment was modified from previous work so that fumes passed successively through reflux condenser, water cooled condenser with trap, water scrubber, and finally through a carbon tower. The cooking operation followed a standard cycle requiring eight hours to complete. From the data obtained on saturation values of the various carbons, cost figures were calculated in terms of pounds oil/pound carbon and cost per 12,000-pound factory batch. There was a large spread in the performance of the various carbon samples.

18786 APTIC NO. 37152

Selheimer, C. W. and Charles H. Borchers

OXIDATION OF FUMES FROM TALL OIL-GLYCERINE ESTERIFICATION WITH OZONE. *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):644-646, Aug. 1954. 1 ref.*

The effectiveness of ozone as a deodorizing agent for fumes from tall oil-glycerine esterification in the point industry was investigated on a laboratory scale. Fumes from the reaction, after passing successively through an air cooled condenser (reflux), water cooled condenser, and water scrubber, were mixed in a chamber with ozone laden air. The ozone was generated up to 0.2 gm per hour. This output was capable of deodorizing the fumes from this reaction up to kettle batch size of 700 gm total.

18787 APTIC NO. 37244

Shah, Indravadan Shantilal

REMOVAL OF SULFUR DIOXIDE FROM GAS FLOWS. *(Entfernung von Schwefeldioxyd aus einem Gasstrom, in dem dieses enthalten ist). Text in German. (Chemical Construction Corp., New York) W. Ger. Pat. 2,109,095. 13p., Sept. 9, 1971. (Appl. Feb. 25, 1971, 8 claims).*

Waste gas containing 0.01-0.08 vol % sulfur dioxide was purified by washing an aqueous suspension containing magnesium oxide or magnesium sulfate in a venturi scrubber at 1.34-5.36 l/cu m flow rate between suspension and gas, 20-95 deg, and pH 4.5-8.8 with regeneration and recycling of MgO. At 5.36 l liq/cu m gas and pH 8.8, 96-98% of SO2 was removed from waste gas.

18788 APTIC NO. 37280

Shah, Indravadan S.

REMOVAL OF SULFUR DIOXIDE FROM WASTE GASES. *(Chemical Construction Corp., New York) U. S. Pat. 3,600,131. 4p., Aug. 17, 1971. 6 refs. (Appl. Jan. 27, 1969, 2 claims).*

A process is provided to efficiently and economically absorb and recover the sulfur dioxide content of waste gas streams, and thus eliminate air pollution and produce a useful sulfur containing product. Sulfur dioxide is recovered from a waste gas stream, such as the flue gas from a steam power boiler which burns a sulfur-containing fuel such as coal, by scrubbing the waste gas stream with an aqueous solution containing sodium sulfite and sodium bisulite. The resulting sodium bisulfite is reacted with magnesium oxide or hydroxide, which converts the sodium bisulfite to dissolved sodium sulfite, with concomitant precipitation of solid magnesium sulfite. The solid magnesium sulfite is separated from the residual solution which is recycled to gas scrubbing, and the solid magnesium sulfite is processed to produce a valuable sulfur-containing product such as magnesium sulfate, elemental sulfur, liquid sulfur dioxide, or sulfuric acid. Fly ash is also simultaneously scrubbed from the flue gas. The chemicals and cost for the process are essentially negligible, and all of the magnesium oxide is recovered. (Author abstract modified)

18789 APTIC NO. 37494

Shigeta, Yoshihiro

BAD ODOR EMISSION CONTROL MEASURES AND EXAMPLES. *(Akushu no haishutsu boshi taisaku to jitsurei). Text in Japanese. PPM (Japan), 3(1):55-62, Jan. 1972. 4 refs.*

Main sources of bad odors in Japan are chemical engineering, Kraft pulp mills, petroleum refining, chemical fertilizer manufacturing, animals, corpses, fishmeal manufacturing, stockyards, public facilities, garage dumps, excretion treatment plants, and sewage treatment plants. In addition, foundries, paint factories, pharmaceutical factories, canneries, enamel electric wire factories, fish paste manufacturing plants, distilleries, fermentation plants, and rubber factories are sources of bad odors. The main points in bad odor control are the normalization of the human relationship between industries and inhabitants in the area, improvement of manufacturing or treatment processes, and improvement of maintenance and management of these odor creating sources. Various types of countermeasures such as dilution, decomposition of odor elements, and elimination of elements are discussed. Various methods of control such as combustion, catalytic oxidation, adsorption, ozone, acid-alkaline scrubbing, ion exchange resin, electrode, and water scrubbing methods are reviewed.

18790 APTIC NO. 37381

Shishkov, Dimiter S., Diko G. Ivanov, Ivan P. Dombalov, Ganka I. Radoeva, and Radka G. Mishtalova

METHOD OF PRODUCING A LOW-TEMPERATURE CATALYST FOR THE CONVERSION OF CARBON MONOXIDE WITH STEAM. *(Himicheski Kombinat, Vratza (Bulgaria)) U. S. Pat. 3,567,655. 1p., March 2, 1971. 2 refs. (Appl. July 25, 1968, 2 claims).*

A method is presented for producing a low-temperature catalyst for the conversion or reformation of carbon monoxide with steam by the joint precipitation and neutralization of zinc, copper, and chromium compounds with a base. One of the basic commercial methods of obtaining hydrogen which is necessary for the synthesis of ammonia and a number of various other products is the conversion of carbon monoxide with steam. The catalyst is formed by precipitating hydrated copper nitrate and zinc nitrate solutions containing chromium trioxide or chromic oxide with ammonia. The precipitate is dried, granulated, and made into tablets such that the catalyst composition consists essentially of about 31.3% by weight copper oxide, 30.5% zinc oxide, and 38.2% chromic oxide or 49.7% copper oxide, 17.8% zinc oxide, and 32.5% chromium trioxide. (Author abstract modified)

18791 APTIC NO. 37252

Siewert, Robert M.

CHANGES IN VALVE TIMING CAN REDUCE EXHAUST EMISSIONS. *SAE (Soc. Automot. Engrs.) J., 79(6):40-44, June 1971.*

Advancing the intake valve opening or the exhaust valve closing time significantly reduced hydrocarbon and nitrogen oxide emissions from a modified V-8 engine under part-load, low-speed test conditions. Advancing the intake valve opening to 45 deg btdc reduced hydrocarbon emissions by 25% and nitric oxide emissions by 38%. Hydrocarbon emission decreased 25% when the exhaust valve closing was advanced to 22 deg btdc. Delaying the closing to 65 deg btdc resulted in an 18% decrease in hydrocarbons. Nitric oxide emissions decreased 45% at the maximum exhaust valve closing advance and 50% at the full exhaust valve closing retard. The valve timing changes appeared to reduce nitrogen oxide emissions by increasing internal recirculation. Increases in internal recirculation may reduce hydrocarbon emissions by selective retention of hydrocarbon-rich quench gases.

18792 APTIC NO. 37121

Slack, A. V.

REMOVAL OF SULFUR OXIDES FROM STACK GAS: RECOVERY VERSUS THROWAWAY METHODS. *Tennessee Univ., Knoxville, Dept. of Civil Engineering, Proc. Ind. Air Pollut. Control Conf., Annu., 1st, Knoxville, Tenn., 1971, p. 29-43. (April 22-23.)*

Of the three major emitters of sulfur dioxide -- power plants, sulfuric acid plants, and smelters -- power plants emit the most sulfur dioxide but have several features that make sulfur dioxide recovery less promising than for the other sources. These disadvantages, added to the prospect of continuing depressed price levels for sulfur products8 have led the utilities in the direction of absorption of sulfur dioxide by lime or limestone and discarding the product to meet the growing restrictions on emissions. Several such installations are in the process of being constructed or are already operating. However, byproduct recovery still offers promise, under favorable conditions and with further development, of being a less expensive way to control emission than the wasteful throwaway route. (Author conclusions modified)

18793 APTIC NO. 37617

Smith, Richard D. and Dale A. Furlong

AIR-POLLUTION-FREE AUTOMOBILE AND METHOD OF OPERATING SAME. *(Combustion Power Co., Inc., Palo Alto, Calif.) U. S. Pat. 3,608,529. 13p., Sept. 28, 1971. 10 refs. (Appl. May 1, 1969, 28 claims).*

A pollution-free, two-stroke internal combustion engine is described which utilizes Otto cycle operation for cruise power and both Otto cycle and diesel cycle operation for above cruise power. Thus, an engine is provided which has a maximum efficiency in the normal horsepower operating range yet is capable of maximum power and torque at higher ranges. With hydrogen as the fuel, water is the only product of combustion, and with liquid gasoline as the fuel, the products of combustion are water, carbon dioxide, and other nonpollutants. The engine can be produced with existing manufacturing technology and achieves current standards for performance, convenience, and economy. Once in production, costs will be approximately similar to present cars. No unusual starting or warm-up problems are introduced. Water is recovered from the engine exhaust and recycled for water spray cooling of the cylinder and pistons during exhaust. Liquid gasoline is introduced in a stream into the engine cylinder and atomized by the oxygen directed into the cylinder. This operation and construction promote fast and uniform combustion.

18794 APTIC NO. 37378

Smith, Robert K.

FUEL EMISSION CONTROL SYSTEM. *(F and E Mfg. Co., Flint, Mich.) U. S. Pat. 3,565,109. 3p., Feb. 23, 1971. 3 refs. (Appl. Sept. 11, 1969, 3 claims).*

One of the problems with automotive fuel systems is the evaporative emission of fuel to the atmosphere. This may occur due to temperature changes, vapors which form when the engine is excessively warm during operation, or when the engine is turned off and the heat rises to cause vapors to be formed. A fuel emission control system is described which will absorb the vapors emitted, effectively prevent excess pressures in the system, and which will return the vapors to the carburetor when the engine is operated. The system comprises a gas tank, interconnecting lines with an inflatable tank, and a pressure responsive valve which is operable to vent the excess pressure in the fuel tank and the inflatable tank to the atmosphere through emission absorptive material. (Author abstract modified)

18795 APTIC NO. 37294

Stadelmann, M.

ENVIRONMENTAL PROTECTION THROUGH THE USE OF CLEAN ENERGIES. *(Umweltschutz durch Einsatz sauberer Energien). Text in German. Schweiz. Bauztg., 89(50):1268-1271, Dec. 1971.*

In Switzerland, 40 tons of dust and waste gases are discharged into the atmosphere/hr. They produce 300,000 tons of emissions/yr. Motor cars contribute 60% of the pollution. The remaining 40% is divided among domestic heaters and industries. The sulfur dioxide content of the atmosphere is primarily influenced by domestic heaters. At the combustion of hard coal for generation of 10,000 kcal heat, 14.0 g sulfur dioxide are produced, 5.0 g of S02 are produced by fuel oil, city gas produces 0.1 g S02, with natural gas no S02 develops. At the combustion of gas, solely CO_2 and water vapor develop. Since gas is transported in underground pipelines, no environmental pollution whatsoever is caused. Electric current, too, is distributed without production of any pollutants. It would be desirable to use gas together with electricity for heating, but unfortunately the power plants and the gas works in Switzerland are momentarily not capable of supplying any large amounts for this purpose.

18796 APTIC NO. 37444

Stark, S. B. and Yu. D. Glebov

DUST SEPARATION FROM GASES AT HIGH TEMPERATURES. *(Ochistka gazov ot pyli pri vysokikh temperaturakh). Text in Russian. Izv. Vysshikh Uchebn. Zavedenii, Chernaya Met., 14(7):168-170, Oct. 1971. 3 refs.*

Granular layer filters with recyclicable filter material are best suited for the dust separation from gases at high temperatures in metallurgic plants. Optimum process parameters were studied in a laboratory on a high-temperature filter with moving granular layers. It was composed of water-cooled tubes spaced at 65 mm. By means of these tubes, a vertical layer of 50 mm thickness was obtained from cast iron particles of 2-3 mm diameter. The ambiant temperature was 650 C, and a water consumption of 0.4 cu m/h was obtained. The dust separation occurred initially on front areas and close to the contact points of the granules. Then the surface build-up was destroyed by the hydrodynamic pressure, causing it to penetrate into the inside of the filter layer. This resulted in increases of both hydraulic resistance and efficiency. The intensity of the dust penetration increased due to motion and the mutual displacements of the granules. An optimum layer speed characterizing stationary operation conditions can be determined for any initial dust concentration and gas flow speed. In this case, the amount of dust removed from the filter is equal to the amount of dust admitted. Both efficiency and hydraulic resistance are determined by the degree of saturation of the layer. An efficiency of 97% and a hydraulic resistance of 84 mm water column were found with an optimum layer speed of 5 cm/sec, securing constant saturation. As the layer speed can easily be controlled, the filtration process can be automated.

18797 APTIC NO. 37295

Staubing, Peter

BASIC PRINCIPLES AND CALCULATIONS FOR THE INSTALLATION OF AIR FILTERS. *(Grundlagen und Berechnungen bei der Einplanung von Luftfiltern). Text in German. Wasser Luft Betrieb, 15(12):434-439, Dec. 1971. 4 refs.*

Air pollutants may be present in gaseous of vaporous form, or in the form of dusts and mists. The dusts in the atmosphere stem mostly from industrial processes. The dust as pollutant is usually contained in a gaseous medium and has grain sizes ranging from 0.1 to 200 micron. Dispersed solid matter with grain sizes between 0.001 and 0.1 micron is called smoke or colloidal dust. The grain size distribution is a decisive factor at the selection of an air filter. Moreover collection efficiency, dust storage, life time, volume flow, and pressure difference are criteria which all must be taken into consideration. The collection efficiency of a filter is determined by the grain sizes of the dust which is to be filtered, by the dust surface properties, and by the density of the dusts. The collection efficiency is generally determined by certain test dusts. The quantity of dust which can be stored without impairing the collection efficiency usually is also determined by experiments. It is mainly influenced by composition, structure, and size of the dust and by the properties of the filter itself. The volume flow which can be cleaned is determined by the filter surface F according to the formula V/v equals F in sq m, where V is the volume flow in cu m/sec and v the admissible inflowing speed in m/sec. Mechanical air filters with an inflowing speed of more than 1 m/sec and a pressure difference of less than 10 kg force/sq m are used for the separation of coarse dusts. Fine dusts are collected in fiber filters with fiber diameters of several micron, where the inflowing speed is mostly about 0.5 m/sec and the pressure differences about 10 kg force/sq m and less.

18798 APTIC NO. 37412

Steinhagen, W. K.

THE AUTOMOBILE AND AIR POLLUTION. *Clean Air, 4(1):4-10, April 1970. (Presented at the Institution of Engineers and Institution of Mechanical Engineers, Symposium on Air Pollution, Oct. 24, 1969.)*

The role of the automobile in the formation of smog is considered, as well as several control methods which have been developed in the United States. Alternative power plants for motor vehicles are also mentioned. By mixing ventilation air with the blow-by gases, and then drawing this mixture through a positive crankcase ventilation valve into the intake manifold where the blow-by gases are returned to the combustion chamber and reburned, crankcase emissions may be completely controlled. The common use of internal venting in modern carburetors results in most of the evaporative losses being consumed in the engine during vehicle operation. Another control method utilizes activated charcoal to trap the vapors during periods when the vehicle is shut down, and then a control system to re-introduce these vapors into the engine induction system for reburning during periods of operation. Catalytic converters and air injection reactor systems are described. The engine factors which play a role in the formation of hydrocarbons, carbon monoxide, and nitrogen oxides are outlined. Gas turbines, Stirling engines, and electric propulsion are considered.

18799 APTIC NO. 37262

Stone, Arthur F.

METHOD AND APPARATUS FOR SCRUBBING GAS. *(Assignee not given.) U. S. Pat. 3,596,885. 5p., Aug. 3, 1971. 2 refs. (Appl. July 24, 1968, 11 claims).*

The method and apparatus for scrubbing gas in order to remove particulate matter from the stream are presented. The invention improves on previous gas scrubbers by moving the cleaning liquid to a high velocity, thus saving a substantial amount of energy. The gas to be scrubbed is conducted into an annular passage and through the rapidly rotating curtain of cleaning liquid provided across the passage by a rotating wheel issuing the liquid from radial jets. The liquid entraps the particulate matter from the gas stream and then drains it. (Author abstract modified)

18800 APTIC NO. 37422

Storp, Klaus

PROCEDURE AND DEVICE FOR THHE REMOVAL OF SULFUR COMPOUNDS FROM GASES. *(Verfahren und Vorrichtung zur Abscheidung von Schwefelverbindungen aus Gasen). Text in German. (Metallgesellschaft A. G., Frankfurt (West Germany)) W. Ger. Pat. 2,009,297. 10p., Sept. 9, 1971. 15 refs. (Appl. Feb. 27, 1970, 5 claims).*

The removal of different sulfur compounds such as hydrogen sulfide and carbon disulfide from gases, particularly spent air, containing oxygen, is made by adsorption on one, two, or a larger number of activated carbon layers spaced at different heights of the absorber unit. Several carbon layers can be pulled in and out of the gas flow, and be regenerated outside the adsorber independent of each other. A separate recovery of H2S and CS2 is made possible by means of desorption and extraction units. Desorption of CS2 is made possible to occur 20-50 times more frequent than extraction.

18801 APTIC NO. 37712

Stotz, Wolfram

NOVEL AEROSOL FILTER CASING WITH INSTALLED ON SITE TEST ARRANGEMENT. *(Neuartiges Schwebstoff-Filtergehaeuse mit eingebauter Vor-Ort-Pruefanordnung). Text in German. Wasser Luft Betrieb, 16(1):20-24, Jan. 1972. 5 refs.*

Aerosol filters serve for the collection of toxic, infectious, and radioactive particles. An aerosol filter casing must be tight, unbreakable, and non-flammable. The interior of the casing must be protected against aggressive gases by an acid and lye resistant coating. A new aerosol filter is described whose casing consists of a self-supporting welded sheet steel structure whose sand-blasted surface has been treated with a two-component lacquer. The filter itself has the dimensions 610 by 610 by 292 mm. Each filter casing is tightly sealed. An improved plastic bag filter replacing method is used for removal of the dust-laden filters. For leak-checking, a paraffin oil mist and air mixture whose droplets have a diameter of 0.3 to 0.5 micron is pressed with low speed (less than 1 mm/sec) through the filter cell. Leaks become visible as more or less thick but very clear milky mist strands. A large aerosol collection system comprising 70 filters is already in operation and another is under construction. Several are in the planning stage. Despite of better performance than older systems, the new system did not involve any higher costs.

18802 *APTIC NO. 37401*

Streeb, Rudolf

RECOVERY OF ORGANIC SOLVENTS. (Rueckgewinnung organischer Loesungsmittel). Text in German. Wasser Luft Betrieb, 16(2): 33-39, Feb. 1972.

For degreasing metals, chlorinated hydrocarbons are nowadays mostly used. A recovery of the solvents from the drawn-off vapors has the advantage of economizing the process and of eliminating the solvent emission. The most efficient method of solvent recovery from waste air at present is the adsorption on activated coal. With the proper selection and maintenance of activated coal plants a collection efficiency of 99% can be achieved. A certain minimum contact time is required for optimum results which means that a flow speed of 0.3 to 0.5 m/sec should not be exceeded. Through the adsorption process the temperature is raised by 10 to 20 C at a solvent concentration of about 40 g/cu m air. One kg of activated coal adsorbs approximately 0.15 to 0.30 kg tri or per 1,1,1-trichlorethane. The high the temperature and humidity of the waste air, the lower the solvent quantity adsorbed by the activated coal. Once the activated coal filter is loaded, desorption must be carried out by means of water vapor. At plants with single filters, the solvent-laden air is blown into the atmosphere during the regeneration period for the filter. In plants with two filters, adsorption and desorption can be alternated. The steam pressure for desorption is 0.5 atm gauge, for each kg recovered solvent, 2 to 3 kg steam are needed. Desorption may last from 40 to 90 min. Cost considerations for such a plant have shown that after 1 and 1/2 yrs of operation, a true profit can be gained.

18803 APTIC NO. 37428

Strimling, Walter E.

GAS PURIFICATION APPARATUS. *(Assignee not given.) U. S. Pat. 3,584,441. 9p., June 15, 1971. 5 refs. (Appl. Jan. 11, 1968, 6 claims).*

A method is presented for reducing reactant granule breakdown in the reactant tanks of the redundant-type gas purification apparatus where the main gas and purge gas are introduced at opposite ends of the reactant tank. The gas purification apparatus is equipped with a purge gas heating arrangement for increasing the efficiency of the purge operation, as well as a depressurizing arrangement for reducing the breakdown of reactant granules in these tanks. A simple control circuit in which a timing portion is removable for replacement with a leak test control panel is also described. (Author abstract modified)

18804 APTIC NO. 37034

Suttle, H. K.

FILTRATION. *Chem. Process. Eng., 39(4):125-131, April 1958. 62 refs.*

In the chemical process industries, filtration is conceived as a gradual change process during which the filter medium becomes partially blocked and, after a particular concentration is reached, cake filtration is the true controlling process. The specific resistance of thin filter cakes is markedly influenced by concentration of the slurry and the initial rate of filtration. In general, the specific resistance is lowered when the rate and the slurry concentration are increased. An attempt to predict the scale-up of continuous filtration equipment, and filtration data for such units, is noted. Four distinct rate processes are visualized: cake formation, cake dewatering, cake washing, and the rate of thermal drying. Filter aids, filter media, air and gas filtration, and filtration in chemical processes are considered.

18805 APTIC NO. 37250

Tamura, Zensuke and Yukio Hishinuma

PROCESS FOR THE DESULFURIZATION OF INDUSTRIAL WASTE GASES. *(Verfahren zum Entschwefeln von Industrieabgasen). Text in German. (Hitachi, Ltd., Tokyo (Japan)) W. Ger. Pat. 1,619,881. 4p., Nov. 11, 1971. (Appl. Sept. 20, 1968, 1 claim). 2 refs.*

The waste gases are contacted with activated carbon for the adsorption of the sulfur oxides contained in the gas. After adsorption the activated carbon is rinsed with water and dried to remove the sulfur oxides and to regenerate the activated carbon. The activated carbon rinsed with water is dried by means of one part of the waste gases, which is mixed, after the drying has been completed, with the rest of the waste gas. The gas mixture thus obtained is contacted with the regenerated activated carbon, and these cycles are periodically repeated. Due to the uniform distribution of humidity and heat between the fraction of gas used to dry the carbon and the rest of the waste gas, very good diffusion and a high degree of adsorption are reached.

18806 APTIC NO. 37278

Thompson, Maynard L.

ODOR CONTROL APPARATUS. *(Honeywell Inc., Minneapolis, Minn.) U. S. Pat. 3,599,841. 4p., Aug. 17, 1971. 2 refs. (Appl. Aug. 6, 1969, 7 claims).*

Apparatus is described which is structurally simpler than that provided by the prior art to remotely control the amount of odor counteractant introduced into the air. It basically comprises a dispenser having an air passage with an inlet and outlet, an air valve arrangement within the air passage, and a vaporizing chamber connected to the air passage. Direct air flow through the air passage is prevented by a partition which divides the air passage into inlet and outlet portions. The vaporizing chamber is adapted to contain vaporizable air treating material and is connected to both the inlet and outlet portions of the air passage. The air valve is constructed and arranged to control air flow into the vaporizing chamber by moving longitudinally toward and away from the valve seat which surrounds the connection of the vaporizing chamber to the air passage. The air valve has a closed position which completely prevents air flow, as well as one or more open positions.

18807 APTIC NO. 37355

Thur, George M.

THE FEDERAL GOVERNMENT APPROACH TO DEVELOP AUTOMOTIVE GAS TURBINES. *Gas Turbine Int., 12(4):44-47, July-Aug. 1971.*

In early 1970, President Nixon announced a Federally sponsored program of research and development to develop alternate power systems for automobiles in the event that industry cannot adequately clean-up the conventional engine to meet the forthcoming standards. There are six categories of candidate power systems competing for development in the Federal R/D program: gas turbine systems, Rankine cycle systems heat engine/electric hybrids, heat engine/flywheel hybrids, advanced design of conventional reciprocating engine systems, and all electric systems. In the Advanced Automotive Power Systems gas turbine program, the approach taken by the Federal government is to emphasize problem-solving research rather than development of a new roadable engine demonstrated in automobiles. These problems include the need for reducing nitrogen oxide emissions, fuel consumption at part load engine operation, costs of materials, and vehicle acceleration lag. In addition, manufacturing techniques must be developed for mass producing the high-speed machinery and the engine system must be developed to be reliable in the hands of the consumer service. The types of research underway are briefly summarized.

18808 APTIC NO. 37275

Tinard, Henri

THE 1972 AUTOMOBILE (CONTINUATION). THE FIGHT AGAINST AIR POLLUTION: A COMPLEX

PROBLEM. (L automobile 1972 (suite). La lutte contre la pollution: un probleme complexe). Text in French. Concours Med. (Paris), no 45:7961-7964, Nov. 1971.

Perfect combustion can be approached by improvements in carburetors, fuel-air adjustment, and spark plugs. Settings made factorially are temporary only. Fuel injection providing uniform fuel distribution is applied in relatively expensive cars only. Catalytic and afterburning methods are expensive, and the catalytic effect is deteriorated by lead additives. To make catalysts more effective, the use of lead should be discontinued. The absence of lead in fuels could be compensated for by expensive refinery processes, lowered compression ratios, or increased stroke volumes. Improvements of carburetion, injection, and ignition air points of main concern at the present time. For city traffic, the electric car would be an ideal solution. West European and Japanese 1972 car models are reviewed.

18809 APTIC NO. 37086

Todd, Harold H., Jr.

PROCESS APPLICATIONS OF ACTIVATED CARBON. *Air Eng., 4(8):26-27, 44, Aug. 1962.*

Adsorption by activated carbon filters is a practical, economic way to prevent air containing odorous or corrosive gases emitted from near-by factories from entering an industrial installation. In automatic micro-wave telephone transmission equipment, precious metal coated relay and other contacts are protected by activated carbon filters. At a hydro-electric plant where it is necessary to keep gaseous contaminants from switch gear and other corrosion-sensitive apparatus, about 700,000 cfm of intake air is purified by activated carbon before it reaches generators, switchboards, and other equipment. The emergency exhaust system of many nuclear reactors have carbon filters in them to prevent the possible escape of radioactive iodine gas in the event of a malfunction within the reactor. Another application of activated carbon is in air conservation or air recovery, i.e., the control of odors and vaporous impurities within an enclosure by continually extracting them from the air as it is recirculating. The greatest advance in the application of carbon has been the recognition of adsorbable type filters as a substitute for outside air in various municipal heating and ventilating codes. Case histories are given.

18810 APTIC NO. 37533

Toles, George E.

NEW SO2 RECOVERY PROCESS. *Chem. Process. (London), 17(12):13-14, Dec. 1971.*

A new sulfur dioxide recovery process utilizes dry fluidized beds of granular activated carbon to capture sulfur oxides in flue gases and convert them to elemental sulfur. As in other processes, SO2 and residual oxygen react on the activated carbon surface to form sulfuric acid, which is held in the numerous carbon pores. The unique feature of the process is that complete conversion of the sulfuric acid to the desired free sulfur form is achieved, using hydrogen as the basic reductant, at 300 F. Since sulfuric acid forms rapidly at 200-300 F, SO2 can be collected with optimum efficiency in existing power plants after the usual heat recovery and just before flue gas is vented to the stack. Full scale recovery units are expected to be commercially available in 3-5 yrs.

18811 APTIC NO. 37077

Tomlinson, C. L. and J. M. Ferguson

ODOUR ABATEMENT IN AN ALKALINE PULP MILL. *Pulp Paper Mag. Can. (Quebec), vol. 57:119-122, Dec. 1956. 6 refs. (Presented at the Canadian Pulp and Paper Association, Technical Section Summer Meeting, Murray Bay, Quebec, June 13-16, 1956.)*

Odor control at an alkaline pulp mill that has been operating with cooking liquor at a sulfidity of between 15 and 20% since the autumn of 1952 is described. Because an urban area is located directly down wind from the mill, very close control over the operation to minimize odors is necessary. The principal measures employed are condensation and cooling of the blow and relief steam in a two-stage system, the final cooling being accomplished at as low a temperature as possible with white water containing residual chlorine, together with 100% oxidation of the weak black liquor prior to evaporation. Correct proportioning of the alkali used for cooking gives good results without requiring too high a sulfidity, and helps in maintaining a uniformly low sulfide concentration in the weak black liquor. Operation of the recovery furnace with adequate excess air to ensure complete combustion, and scrubbing of the furnace gases with oxidized liquor are considered necessary.

18812 APTIC NO. 37078

Tremaine, Breckinridge K.

INDUSTRIAL REODORANTS. THEIR USES IN PLANT AIR CONDITIONING SYSTEMS. *Air Cond. Heat Ventil., vol. 52:83-85, Feb. 1955.*

Improvement in plant interior atmosphere is possible if specifically designed reodorants are used. These products when applied in an aqueous air scrubbing system, for both circulated and reciculated air, will help to correct an interior nuisance or musty depressing atmosphere at a low unit cost and without large capital expenditures. In some cases, as little as one-tenth of a part per million parts of air provides a clean pleasant odor without excessive sweetness or obvious aromatic scent. Application can be made mechanically without excessive foaming in high pressure jet-type spray washers. Costs for daily application of a selected reodorant may average less than one cent per unit per hour of operation.

18813 APTIC NO. 37101

Trobeck, K. G., Walter Lenz, and A. Tirado A.

AIR POLLUTION CONTROL PROCESS IS SWEDISH-MEXICAN DEVELOPMENT. *Pulp Paper Int., April 1959:44-48. 2 refs.*

At a kraft pulp mill in Mexico, odors liberated from a multiple-effect evaporator are completely eliminated by proper oxidation of black liquor with air. A surface condenser with temperature held at 50-60 C produces contaminated condensate water in smaller batches during digester blows, which makes it easier to destroy odors in such condensate water. A special scrubber promotes good contact between air, noncondensable gases, and contaminated condensate water from the digesters. In this way, all the noxious compounds from the blow-off and relieving of digesters are treated at once in a single apparatus. The result is a definite reduction of air pollution from the gases and a virtual elimination of odors from condensate water. Additional control measures are the detection of odors by a Tritilog and a network of human observers.

18814 APTIC NO. 37113

Turk, Amos and Alvin Berlin

ODOR CONTROL PERFORMANCE OF CARBON-LOADED RAYON MONOFILAMENTS. *J. Appl. Polymer Sci., 5(18):668-675, 1961. 9 refs.*

The odor control performance of carbon-loaded rayon monofilaments depends on the type and proportion of activated carbon used. The filter efficiency in turn determines the rate of odor reduction in a closed space and the ultimate or equilibrium concentration when odorant generation and removal occur simultaneously. Four types of filters were evaluated: rayon loaded with air or water-purification carbon, granular air-purification carbon, and open-lattice commercial filters. Air laden with synthetic tobacco malodor was streamed through successive increments of adsorbent bed. Sensory odor judgements were made before and after each adsorption stage by matching the effluent odors with those from mixtures of

known concentrations. It was thus possible to estimate adsorption efficiencies and, by repeating the measurements after various degrees of carbon saturation, to construct adsorption waves. It was found that air-purification carbon was superior to water-purification carbon for leading in the rayon filaments, and that all the rayon-carbon compositions were much superior to the commercial open-lattice filters. The rayon-carbon filters showed efficiencies up to 70% for one pass at 0.1 sec detention time through a three-fourth-in. bed packed at 0.096 g/ml with a filament comprising 20% rayon and 80% carbon. (Author summary)

18815 APTIC NO. 37135

Turk, Amos and Bownes, K. A.

ADSORPTION CAN CONTROL ODORS. *Chem. Eng., vol. 58:156-158, May 1951. 3 refs.*

Activated carbon is being used increasingly to prevent air contamination by odorous and toxic compounds because it has a high retentive capacity for gases and vapors. Because activated carbon, unlike oxygenated sorbents such as silica gel or activated alumina, is non-polar, it has no retentivity for water vapor. Thus the presence of moisture in the polluted air way does not lessen the effectiveness or efficiency of the purification process. Equipment and engineering for the application of activated carbon to air purification must combine efficient removal of the pollutants for a reasonably extended time with low resistance to air flow. This requires an adequate amount of granular carbon arranged in thin beds, coupled with a linear air flow rate through the beds that will insure sufficient duration of contact between polluted air and sorbent. A carbon canister and a carbon cell designed to meet these requirements were illustrated. For either type of equipment, the efficiency of adsorption will be at least 95% until the carbon adsorbs between 15 and 20% of its weight of pollutants. Calculation of the service life of activated carbon is demonstrated.

18816 APTIC NO. 37084

Ullrich, A. H. and R. J. Ruff

OXIDATION OF SEWAGE ODORS. *Water Sewage Works, 106(1):395-397, Sept. 1959.*

A catalytic oxidation unit that has successfully controlled odor problems from the storage of sewage in a surge tank adjacent to a residential area in Austin, Texas is described. The contaminants released with the air from the holding tank are a mixture of complex hydrocarbons, mercaptans, amines, and other organics. All of these gases can be oxidized to produce end products of water vapor, carbon dioxide, and free nitrogen. The catalyst accelerates the oxidation reaction and permits combustible constituents to be consumed when the odor-laden air is heated to temperatures of 500 to 600 F. The catalyst is similar in appearance to a metallic air filter mat. It consists of a high nickel alloy, crimped ribbon material, packed between similar high nickel container screens and surrounded by an alloy channel frame. Odorous gases are drawn into the system, preheated by a gas burner before passage through the exhauster fan, and then discharged through the catalyst bed before release to the stack.

18817 APTIC NO. 37254

Victor, Irving

CONTROL OF GASES AND VAPOR EMISSIONS FROM INDUSTRIAL AND DRYCLEANING PROCESSES COMPARING EFFICIENCY AND OPERATING COST OF INCINERATION, ABSORPTION, CONDENSATION AND ADSORPTION METHODS. *Preprint, Dept. of Commerce, Washington, D. C. and Water Pollution Control Federation, Washington, D. C., 9p., 1971. 10 refs. (Presented at the Technical Conference on New Technology in the Solution of Practical Problems in Air and Water Pollution Control, Tokyo, Japan, Dec. 8, 1971.)*

Control techniques for emissions of industrial chemical solvents, primarily hydrocarbons, from various industrial processes (surface coatings and vapor or solvent degreasing) and dry cleaning systems are reviewed. The efficiency, basic process, and operating costs of adsorption, especially activated carbon adsorption, incineration, absorption for scrubbing acids, chlorine, and ammonia, and condensation are examined.

18818 APTIC NO. 37745

Volfkovich, S. I., I. M. Boguslavskiy, S. B. Kazakova, N. S. Bogdanova, I. P. Khudoley, V. G. Voytsekhovskiy, T. V. Vovk, and Ye. A. Malysheva

PRODUCTION OF BIFLUORIDE-AMMONIUM FLUORIDE AND WHITE SOOT FROM OUTGOING FLUORINE-CONTAINING GASES IN THE PRODUCTION OF SUPERPHOSPHATES. *(Polucheniye biftorida-ftorida ammoniya i beloy sazhy iz ftorsoderzhashchikh gazov superfosfatnykh proizvodstv). Text in Russian. Khim. Prom. (Moscow), no 12:22-24, 1971. 5 refs.*

Laboratory and pilot-plant experiments were carried out to elaborate methods for the complex utilization of waste gases containing fluorine. Waste gases were absorbed by recycled ammonium fluoride solution containing 6-10% NH4F and 1-2% NH3. The solution thus obtained contained 15-20% ammonium silicon fluoride and 0.5-2% of H2SiF6. Excess ammonium hydroxide was used for neutralization which produced ammonium fluoride and SiO2. The pulp contained ammonium fluoride in concentrations of 15-20%. After agitation and cooling to 40 C, the liquid and solid phases were separated in four filters. The filtrate obtained on one of these filters was recycled to the absorption process. Three subsequent washing cycles were applied for SiO2, followed by the drying of the sprayed powder using high-temperature waste gases. The SiO2 thus obtained was used as additive to rubber products. The filtrate from the first filter, containing 15-20% ammonium fluoride, was subjected to two-stage condensation. A concentration of 60% was reached in the first stage, using atmospheric pressure, while the condensation was increased to 90% in the second stage, in applying a pressure of 380-420 Hg mm. After cooling and centrifugation to a residual humidity of 1.5-1.8%, a standard quality product was obtained.

18819 APTIC NO. 37738

Voogd, Maarten

SMOG CONTROL SYSTEM EMPLOYING AN EMULSION OF WATER IN GASOLINE. *(Assignee not given.) U. S. Pat. 3,606,868. 6p., Sept. 21, 1971. 9 refs. (Appl. May 14, 1970, 5 claims).*

A method and system are presented for continuously introducing an emulsion of water in gasoline into an internal combustion engine. The presence of the water reduces the reaction temperature of the gasoline and air in the engine cylinders, with the result that the formation of nitrogen oxides is substantially reduced. The emulsifying apparatus comprises an emulsifying chamber and a rotary stirry device adapted to be driven to emulsify the water in the gasoline. The volume control apparatus includes a conduit for gasoline, a conduit for water, means for pumping the gasoline and water to the emulsifying chamber, and means for adjusting the relative flow in each conduit so that controlled amounts of water and gasoline are delivered to the chamber. The fuel regulating 0apparatus includes a carburetor having a fuel chamber for accumulating the emulsion and a return line between the carburetor fuel chamber and the emulsifying chamber for returning partially separated gasoline and water to the emulsifying chamber.

18820 APTIC NO. 37053

Walker, R. L. and P. P. Marinak

PRESSURE AND TEMPERATURE CONTROLS ON ELECTRIC FURNACE FUME COLLECTION SYSTEM. *Instr. Metals Ind., vol. 21:3.3-1 to 3.3-4, 1971. (Presented* *at the Instrumentation Society of America, Metals Industries Instrumentation Symposium, 21st, Baltimore, Md., March 23-25, 1971.)*

An electric furnace system which utilizes direct evacuation of the fume into a baghouse is described. The flow of gases from the furnace passes through a water cooled elbow and water cooled retractable duct which is the link-up of the furnace fume to the baghouse collector. The gases then pass through a horizontal section of duct in which there are three natural gas burners firing into the stream of gases. The purpose of these burners is to burn off any carbon monoxide or combustible materials generated in the furnace before they reach the baghouse. The gases then flow vertically down through a spray tower where they are cooled to 850 F. After the spray tower the gases flow through the horizontal duct past the furnace pressure control butterfly to a mixing chamber where the gases from all three furnaces meet. The gases flow out of this mixing chamber to the inlet of the three main exhaust fans. The various pressure and temperature controls involved are described.

18821 APTIC NO. 37123

Wallach, Abraham

SOME DATA AND OBSERVATIONS ON COMBUSTION OF GASEOUS EFFLUENTS FROM BAKED LITHOGRAPH COATINGS. *J. Air Pollution Control Assoc., 12(3):109-110, March 1962. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 54th, New York, June 11-15, 1961.)*

Three criteria were considered in testing the effectiveness of high temperature incineration and catalytic combustion in controlling effluent vapors from the baking of lithographed cans: total aldehydes, smell tests, and visual presence or absence of smoke or fumes in the exhaust gases. Results showed that although an operation may be kept quite constant, with the same amount of various solvents being used for coating, the aldehyde content of gases from baked lithograph coatings can vary widely. Unless there is 100% combustion of oven vapors, a decrease or increase of total aldehydes will not necessarily be reflected in a similar decrease or increase in the irritancy of the stack gases. Total aldehydes may actually increase when these coating vapors are oxidized. Visible fumes or smoke from stacks may be completely eliminated, yet the irritant effect aspect of a problem may not be alleviated and may be increased.

18822 APTIC NO. 37414

Warshaw, Abe

REMOVAL OF NITROGEN OXIDES FROM A GAS STREAM. *Chemical Construction Corp., New York, N. Y.) U. S. Pat. 3,565,575. 3p., Feb. 23, 1971. 1 ref. (Appl. May 22, 1968, 5 claims).*

A gas stream containing nitrogen oxides, such as the tail gas from a nitric acid plant, can be scrubbed with an aqueous urea solution. The nitrogen oxides dissolve in the solution to form nitrous acid, which reacts with the urea to form nitrogen, carbon dioxide, and water. Principal advantages of this process as compared to the prior art are that the process does not involve high cost catalysts or high temperature equipment. In addition, the process is economical and employs urea, which is a bulk chemical readily available in tonnage quantities. (Author abstract modified)

18823 APTIC NO. 37493

Wentworth, Joseph T.

VAPOR RECOVERY USING A PLURALITY OF PROGRESSIVELY ABSORBENT BEDS CONNECTED IN SERIES. *(General Motors Corp., Detroit, Mich.) U. S. Pat. 3,575,152. 6p., April 20, 1971. 2 refs. (Appl. Oct. 1, 1969, 10 claims).*

An improved vapor recovery system for an internal combustion engine is described which will effect a more closely controlled adsorption-desorption cycling in order to trap hydrocarbon vapors which might otherwise be lost to the atmosphere. It is proposed to feed these hydrocarbon vapors to the engine in such manner that a minimum effect occurs upon engine operation with a minimum increase in emissions of unburned hydrocarbons. The system comprises at least two vapor adsorbent beds connected in series to the fuel bowl of the engine carburetor and to the fuel tank with the adsorbent bed nearest to the source of fuel vapor becoming most saturated during an adsorption cycle. Throttle-controlled valve conduits connect the adsorbent beds to the fuel-air induction conduit of the carburetor whereby the least loaded adsorbent bed is purged during low engine loads but, as the throttle is opened to the full open position, all of the adsorbent beds will be purged. (Author abstract modified)

18824 APTIC NO. 37004

West, P. H.

CHEMICAL AND HEAT RECOVERY WITH THE VENTURI SCRUBBER AT THILMANY. *Tappi, 38(7):399-402, July 1955. 7 refs. (Presented at the Technical Association of the Pulp and Paper Industry, Annual Meeting, 40th, New York, Feb. 21-24, 1955.)*

In 1946 a pilot plant venturi scrubber, using water to clean recovery furnace flue gases, was tested at a kraft pulp mill and showed chemical recovery efficiencies of about 90%. A similar full-scale unit, installed in 1947 following the existing 120-ton recovery units, substantiated these findings. Further pilot studies, employing concentrated black liquor instead of water, indicated improvement in heat recovery efficiency over that of conventional kraft recovery systems, while maintaining a high degree of chemical recovery. By mid-1951, because of greatly increased pulp production and the demand for 600 psi steam, a new 250-ton black liquor recovery unit equipped with a black liquor venturi scrubber was purchased. Cost considerations, space requirements, trouble free operation, high chemical recovery efficiency, and maximum heat recovery were considered in the decision to include the venturi scrubber as an integral part of the recovery unit. (Author abstract modified)

18825 APTIC NO. 37279

Wheeler, Roger M.

APPARATUS FOR EXTRACTING SOLIDS FROM A GAS STREAM. *(American Magnesium Co., Tulsa, Okla.) U. S. Pat. 3,601,374. 6p., Aug. 24, 1971. 5 refs. (Appl. Aug. 5, 1968, 8 claims).*

An apparatus for extracting solids from a gas stream is provided, which includes a conical baffle supported in a venturi-type configuration gas flow chamber in a scrubber column. A method is provided of varying the position of the conical baffle to ensure maximum effectiveness of the separating apparatus under different conditions. Dry processes are usually satisfactory for extracting solid particles from gas streams if the entrained solid particles are relatively large, while wet separators or scrubbers are usually more effective in extracting solid particles of small dimensions. The present scrubber offers advantages over previous devices by providing increased and more effective contact between the gas stream and the scrubbing liquid without imparting increased back pressure to the gas stream. It also provides a means for adjusting the elements according to changes in flow rate or other parameters of the system.

18826 APTIC NO. 37220

Wilson, Joseph George

PROCEDURE AND APPARATUS FOR THE REMOVAL OF SULFUR DIOXIDE FROM WASTE GAS. *(Verfahren und Vorrichtung zum Entfernen von Schwefeldioxyd aus einem Gas). Text in German. (Shell Internationale*

Research Maatschappij NV, The Hague (Netherlands) W. Ger. Pat. 2,108,756. 12p., Sept. 9, 1971. (Appl. Feb. 24, 1971, 7 claims).

The continuous removal of sulfur dioxide from waste gas, especially hot flue gases, and the simultaneous regeneration of the adsorbent without lowering the temperature, at approximately 1 atm, was performed in an apparatus consisting of a rotating element containing eight segments charged with the adsorbent, e.g., copper or copper oxide on aluminum oxide or silicon dioxide, and two chambers on opposite sides of the rotating element. The SO2 containing waste gas and the regenerating gas were conducted countercurrently through the first and second chambers, respectively, and in an axial direction through the rotating element.

18827 APTIC NO. 37085

Witcher, Henry A.

SINCLAIR AUTOMATES LPG ODORIZER. *Hydrocarbon Process., 44(4): 119-122, April 1965.*

An injection device which is part of an automatic loading rack operation and that injects ethyl mercaptan as nearly continuously as practical into liquid propane gas products flowing into transport truck tanks is described. The device mechanically prints a record of the amount of injected malodorant on the delivery ticket, furnishes a means for visibly checking the volume of malodorant displaced from a reservoir into LPG products, and provides a reliable way of preventing the delivery of the product to the transport truck tank in case of failure to continuously inject the required amount of malodorant. The automatic odorizer was designed to fit into a loading terminal system which is equipped with positive displacement meters. The injection rate of one cubic centimeter per 15 gallons of LPG is equal to 1.2 lb. of malodorant per 10,000 gallons. The flow scheme is illustrated.

18828 APTIC NO. 37064

Woodward, Eric R.

CHLORINE DIOXIDE FOR ODOR CONTROL. *Tappi, 36(5):216-221, May 1953. 21 refs. (Presented at the Technical Association of the Pulp and Paper Industry, Alkaline Pulping Conference, 6th, Mobile, Ala., Nov. 12-14, 1952.)*

The use of chlorine dioxide in a limited number of industrial plants which are notorious for the discharge of obnoxious odors has met with success on a commercial scale. The effluent gases contain methyl and ethyl amines, hydrogen sulfide, and mercaptans. As with any other chemical remedy, efficient contact between chlorine dioxide and the offending odors is essential. This involves proper ventilation of buildings where the odors originate, adequate collection and transfer of the odor-bearing medium to the point of treatment, and efficient scrubbing of the odorous compounds before release to the surrounding atmosphere or terrain. Application to kraft mill odors, methods of generating and applying chlorine dioxide, and possible corrosion problems are discussed. (Author abstract modified)

18829 APTIC NO. 37100

Woodward, E. R. and E. G. Fenrich

ODOR CONTROL WITH CLO2. *Chem. Eng., vol. 59:174-175, April 1952. 3 refs.*

The successful use of the selective oxidizing action of dilute chlorine dioxide scrubbing solutions in destroying odors from various rendering plants is described. There are generally two types of organic pollution problems that can be handled with ClO2 solutions. In one, odorous vapors from equipment such as cookers in a rendering plant can be absorbed in water in barometric condensers. If water is plentiful so that it need not be recirculated to the condensers, then it is generally sewered without chemical treatment, unless stream pollution is a problem. However, if water is restricted and must be recirculated, then it can be treated with ClO2 of the proper concentration for killing the odors. In the other type of problem, where odors contaminate the atmosphere of processing buildings, exhausting of the atmosphere through scrubbers sprayed with ClO2 water is highly effective. Air should be completely changed every two or three minutes. In fat splitting operations in soap manufacturing and other types of fixed oil processing, ClO2 removed 89% of the odor at nominal expense.

18830 APTIC NO. 37068

Wright, R. H.

ODOR COUNTERACTION. *Chem. Can., 10(4):37-41, April 1958. 15 refs.*

Evidence for the phenomenon of odor counteraction as distinguished from odor masking is examined in the light of current theories of olfaction. On the basis of several experiments it is concluded that the action of the commercial smoke-odor counteractant is actually a masking effect. The odor of a great many substances is actually a combination of two distinct sensations, one being true odor which is mediated through the olfactory nerve and the other a common chemical sense which is mediated through the trigeminal nerve. Opinions differ as to the relative importance of the two types of sensation in particular cases, but the fact that there are the two and that they operate through distinct and distinctly different mechanisms makes it impossible that odor counteraction in the usual sense will be either a common or very useful phenomenon.

18831 APTIC NO. 37094

Wright, R. H., M. A. Schoening, and L. W. Shemilt

THE EFFECT OF BLACK LIQUOR FIXATION ON THE RELEASE OF KRAFT ODORS. *Tappi, 36(4):180-183, April 1953. 11 refs.*

In place of the regular feed of unoxidized black liquor to a kraft mill semipilot oxidation tower, oxidized black liquor was fed continuously to the recovery system for a five-hour period. Throughout the day gases from the recovery system were sampled to determine concentrations of hydrogen sulfide and methyl mercaptan, and liquids, to determine their sodium sulfide concentration. Specific gases and liquids analyzed were evaporator noncondensable gases, evaporator contaminated condensate, evaporator jet-condenser effluent, furnace gases, stack gases, weak black liquor, and strong black liquor. Though H2S in stack gases rose to high values at the end of the day, there was definite overall reduction in the amounts of both H2S and methyl mercaptan liberated by the stack and evaporator. A black liquor fixation system combined with an adsorber of digester gases should provide effective control of kraft odors.

18832 APTIC NO. 37715

Youhouse, Joseph

EXHAUST DEVICE ATTACHABLE TO COMBUSTION ENGINE FOR AFTERBURNING OF EXHAUST GASES. *(An eine Brennkraftmaschine anschliessbare Auspuffanlage zur Nachverbrennung der Abgase). Text in German. (Auscot Corp., Miami, Fla.) W. Ger. Pat. 1,918,478. 7p., Oct. 7, 1971. (Appl. April 11, 1969, 6 claims).*

A device for afterburning of automobile exhaust gases consists of an igniter that is started by an electric battery and lights the exhaust gas mixture. Combustion air for this process is brought in through a separate pipe line which protrudes into the combustion space. The burning gases are directed into a turbine which is set into motion and are released into the open atmosphere after having passed through the stationary outlet blades of the turbine. The turbine assembly includes a built-in automatic device for regulating the rotating speed of the turbine. The turbine shaft is coupled to a small dynamo for generating electric current. The effect of the turbine is twofold: it increases the turbulence in the combustion space causing better combustion and achieves a noise dampening effect, thus eliminating the need for a muffler in the exhaust system.

18833 APTIC NO. 37328

Zarnett, G. D. and F. Besik

INCINERATION, AIR POLLUTION AND RECLAIMING SOLID WASTES. *Water Pollution Control (Toronto), 110(1):26-28, Jan. 1972. 9 refs.*

The collection and disposal of solid wastes in the United States costs approximately $4.5 billion a year and is expected to rise to a level of $7.0 billion by 1980, while the problem in Canada is of a lower magnitude. The average compositions of refuse, per capita quantities for the United States and Metropolitan Toronto are compared. Variations are usually attributed to seasonal, climatic, and social differences along with the general random nature of the daily composition. However, the similarity in composition data indicates that analyses applicable to United States wastes can be used in Canada as a reasonably good approximation. Using a base reference of 1,536,000 tons/yr of refuse and a value of 0.63 tons/yr/capita for 1971, data are generated for population, refuse quantities, and refuse compositions for 1981 and 1991. Furnace emissions are also calculated using specific furnace emission factors for different types of incineration. The concentration of carbon monoxide in the combustion gases is indicative of the efficiency of the combustion process. Several factors indicate that within the next decade reclamation of waste material will become an ecological necessity.

18834 APTIC NO. 37465

Zehnder, E

ENVIRONMENTAL PROTECTION IN THE CHEMICAL INDUSTRY (VI): WASTE DISPOSAL (SOLID, LIQUID, GASEOUS). *(Umweltschutz in der chemischen Industrie (VI): Abzutrennende Abfaelle (fest, fluessig, gasfoermig). Text in German. Chem. Rundschau (Solothurn), 24(50):1295, 1297, Dec. 1971. 3 refs.*

In any waste disposal, a check should be made as to which solid, liquid, or gaseous waste material or components can be re-used. In plants which produce a single product, the re-use of waste material should be integrated into the production process. In plants with multiple and frequently changing production programs, group or centralized waste product treatment is necessary. Special plants for exceptional cases and for post-treatment of waste material coming out of group or centralized treatment plants are usually required. For separation of a component from waste gas for return to the process, dry or wet cyclones, dry or wet electrostatic precipitators, packed towers, and activated coal adsorbers are suitable. For post-treatment of waste gases which are preliminarily treated in group or centralized waste gas cleaning systems, packed towers, activated coke adsorbers, chemical oxidation, and catalytic oxidation are suitable.

MEASUREMENT METHODS

18835 APTIC NO. 36965

CARBON MONOXIDE IN AIR. *Natl. Bur. Std. (U. S.) Tech. Note, no. 545:3-9, Dec. 1970.*

Carbon monoxide in air was determined by a method involving the separation of CO from oxygen, nitrogen, and hydrocarbons in Ascarite and stainless steel chromatographic columns, followed by conversion of CO to methane on a nickel catalyst, and subsequent analysis of methane by a flame ionization technique. The method is suitable for determining CO with sufficient accuracy for certification of standard reference gases containing 10-1000 ppm CO. Mixtures prepared this way are stable over extended periods of storage.

18836 APTIC NO. 37154

TENTATIVE METHOD OF TEST FOR CONCENTRATION OF ODOROUS VAPORS. *Book ASTM Stand., pt. 7:1537-1540, 1955. 2 refs.*

A tentative method, designated D 1354-55T by the American Society for Testing and Materials, is proposed for the determination of the concentration of odorous vapors in the atmosphere. At least 50 g of granular activated carbon, previously dried for six hours at 150 C and weighed, is used to adsorb the vapors. The duration of the sampling period should be such that approximately 1000-5000 l air/g carbon are passed through the carbon bed. After the sampling, the adsorbent is weighed and the moisture content of the sample is determined by xylene distillation. If it is known or suspected that some of the odorous vapors are water-soluble, an aliquot sample of the aqueous layer should be withdrawn from the Stark and Dean moisture trap, and the proportion of the water in the aliquot should be determined by a chemical aquametric method such as the Karl Fischer titration. The degree of saturation of the carbon should fall between approximately 0.02 and 0.12; otherwise the sampling should be repeated with an appropriate adjustment in the ratio of volume of sampled air per unit weight of carbon. The odorous vapors may be desorbed from the surface of the carbon and recovered for qualitative analysis if desired. There are two methods of desorption: displacement of the adsorbed organic vapors by a hot inert vapor such as steam, and heating the carbon in a vacuum and distilling the desorbed material into cold traps.

18837 APTIC NO. 37217

Institution of Gas Engineers, London (England)

RECOMMENDED ANALYTICAL METHODS FOR GAS WORKS AND COKE OVEN EFFLUENTS. *Inst. Gas Eng., Commun., 831(2):1-30, Dec. 1970. 7 refs.*

Methods are given for the determination of nitrate, sulfide, thiosulfate, total chromium and chromate, iron, nickel, and potassium in effluents from gas works and coke ovens and for preliminary treatment before analysis for metals in the effluents. The methods are colorimetric (nitrate, sulfide, total chromium and chromate, iron, nickel); precipitation (sulfide); polarographic (thiosulfate); iodimetric (thiosulfate); flame photometry of spectrophotometry (potassium); and the nitric acid/sulfuric acid and nitric acid/perchloric acid methods for preliminary treatment.

18838 APTIC NO. 37385

Impulsphysik G.m.b.H., Hamburg (West Germany)

TELE-FUMOSENS MONITORS AIR POLLUTION. *(Tele-Fumosens, ueberwacht Luftverschmutzung). Text in German. Umwelt (Duesseldorf), 2(1):51, Feb./March 1972.*

The Tele-Fumosens is a laser-lidar which has been developed for meteorological studies and for monitoring air pollution. The Tele-Fumosens is based on Q-switch operation with a 20 to 100 MW pulse power and a maximum 5 to 1 Hz pulse frequency. The problem of cooling is solved either by a closed cooling circuit or by connection to a water tap. The receiver contains a Cassegrain mirror optic of 400 mm diameter. The reflected laser pulses are amplified by a photo-multiplier. A connection of the receiver to a computer is feasible.

18839 APTIC NO. 37455

THE WAY ENEL APPROACHES THE POLLUTION PROBLEM. *(Come l ENEL affronta il problema dell inquinamento). Text in Italian. Inquinamento, 13(9):14-15, Nov. 1971.*

The Italian thermoelectric power industry has installed monitoring stations near power plants in Piacenza, Chivasso, Turbigo, Ostiglia, La Spezia, Vado Ligure, and Ancona. In addition to stationary monitoring units, mobile laboratories measure sulfur dioxide emissions, dust fall, and several meteorological parameters including the vertical temperature profile to a height of 500 m. Recently lidar, an optical radar sensor using laser rays, has been applied to pollution research. Its operation is basically similar to that of a conventional radar sensor except that the electromagnetic impulses have frequencies from visible regions of the spectrum. When a laser ray encounters a smoke bank or a cloud, an echo is received and measured. The lidar has several applications in pollution research including the study of the rise and dilution of gases in the atmosphere. Data thus gained serve to supplement or to verify theoretical studies or measurements obtained by more conventional means and methods like photography, baloons, and light reflectors. Another application is suggested by the possibility of determining the height of temperature inversion strata. The thickness of the underlying adiabatic layer is of primary importance for the forecasting and control of pollution.

18840 APTIC NO. 37535

Her Majesty s Factory Inspectorate, London (England), Dept. of Employment

IRON OXIDE FUME. *Methods Detect. Toxic Subst. Air., no.21:1-10, 1971. 4 refs.*

The extraction of iron from ores and its processing into various iron and steel shapes can lead to the evolution of high concentrations of iron and iron oxide fume and dust. The recommended threshold limit value for an 8-hour day of continued exposure to iron oxide fume is 10 mg/cu m. In a simple field test for iron oxide, the fume or dust is collected on a filter paper and then dissolved in an acidic solution. A solution of 4,7-diphenyl-1,10-phenanthroline disulfonic acid disodium salt is added, which with ferrous ions form a water-soluble red complex. The iron is determined either spectrophotometrically or by visual comparison with a set of color standards. Detailed instructions are given for carrying out the test, which can also be used with little modification to determine water soluble iron salts (as iron) in air. The current threshold limit value for these salts is 1 mg/cu m.

18841 APTIC NO. 37728

Japan Public Health Assoc.

THE RESULTS OF COMPARABLE ESTIMATIONS OF THE CONCENTRATION OF FLOATING PARTICULATE SUBSTANCES IN THE AIR BY MEANS OF LIGHT SCATTERING, TAPE AIR SAMPLER, AND FILTER WEIGHT METHODS. *(Hikari sanran ryushi nodo ho, tepu ea sampura ho, roshi juryo nodo ho ni yoru taikichu fuyu ryushijo busshitsu nodo no hikaku sokutei kekka). Text in Japanese. 11p., 1970 (?).*

Values estimated by means of the filter weight method (selected as the standard estimation method for particulate substances in the air), light scattering, and tape air sampler methods were compared. The estimation was made continuously in Tokyo, Osaka, Ichihara, and Kobe. From the data obtained, the correlation between the particulate weight concentration and the number of counts in light scattering methods, and between particulate weight concentration, transmittance, and reflectance of the filter tape air sampler was calculated. Transmittance was expressed by Log I/Io, where Io stands for incident light and I for transmittant light. Reflectance was calculated from the (Xo X)/(Xo - D) formula, where Xo stands for the reflectance of the filter that does not collect particulates and D stands for the reflectance of standard black filter. From the above comparison, it was clear that the best was the correlation between the number of counts by the light scattering method and particulate weight concentration, followed by correlation between transmittance through a filter of a tape air sampler and the particulate weight concentration, and the worst was the correlation between the reflectance of the filter of a tape air sampler and the particulate weight concentration.

18842 APTIC NO. 37221

Adams, D. F., D. Falgout, J. O. Frohliger, J. B. Pate, A. L. Plumley, F. P. Scaringelli, and P. Urone

TENTATIVE METHOD OF ANALYSIS FOR MERCAPTAN CONTENT OF THE ATMOSPHERE. *Health Lab. Sci., vol. 7:270-275, Oct. 1970. 9 refs.*

Mercaptans (organic thiols) are collected by aspirating a measured volume of air through an aqueous solution of mercuric acetate acetic acid. The collected mercaptans are subsequently determined by spectrophotometric measurement of the red complex produced by the reaction between mercaptans and a strongly acid solution of N, N-dimethyl-p-phenylenediamine and ferric chloride. The method determines total mercaptans below 200 micrograms/cu m (102 ppb). For concentrations above 100 ppb, the sampling period can be reduced or the liquid volume increased either before or after aspirating. When sampling air at the maximum recommended rate of 1 l/min for 2 hr, the minimum detectable mercaptan concentration is 3.9 micrograms/cu m (2.0 ppb methyl mercaptan at 760 torr and 25 C).

18843 APTIC NO. 36973

Akland, Gerald G.

DESIGN OF SAMPLING SCHEDULES. *Preprint, Air Pollution Control Office, Research Triangle Park, N. C., Div. of Atmospheric Surveillance, 8p., Aug. 2, 1971. 4 refs.*

Concern with the statistical precision associated with sampling schedules for high-volume air samplers led to comparison of two sampling schemes: modified random and systematic. The modified random sampling method entials dividing the year into 26 nonoverlapping time intervals (two weeks) and randomly selecting a sampling day within each interval. A condition is that sampling must occur on each day of the week at approximately the same frequency throughout the year. The systematic method is very simple; it involves selection of a sampling interval (other than seven days or multiple of seven), the random selection of an initial sampling data, and regular sampling at 13-day intervals. Data from six years of sampling provided a basis on which to perform hypothetical sampling by the two methods. The systematic method generally gave better results, including more precise yearly estimates of pollutant means.

18844 APTIC NO. 36970

Annand, Robert R., Ike Y. Chang, and R. M. Hurd

AN INVESTIGATION OF PHYSICOCHEMICAL METHODS FOR DETECTING TOXIC PROPELLANTS. *Tracor, Austin, Tex., Wright-Patterson AFB Contract AF 33(657)-8140, Proj. 6302, Task 630203, AMRL-TDR- 63-61, 47p., June 1963. 27 refs.*

NTIS, DDC: AD 417347

Literature on physicochemical measurement techniques used in investigating phenomena in surface adsorption, corrosion, and dielectric and electromagnetic effects was surveyed to determine their potential merit for the detection of toxic concentrations of propellants. Of the 14 specific types of measurement techniques found, surface conductivity of semiconductors, ionization by radio frequency excited helium, and halogen enhanced flame ionization were studied experimentally for ability to detect ppm levels of lithium and beryllium salts, hydrazine and its derivatives, hydrogen chloride, hydrogen, chlorine, and nitrogen oxides in ambient air. Best general results were determined with the surface conductivity detector. Sufficient sensitivity for lithium salts was readily obtained by flame ionization. High sensitivity for UDMH was obtained through ionization by rf excited helium. For the three techniques, signal response and return to zero were very rapid and neither water vapor nor carbon dioxide interfered. Hydrocarbons, particularly benzene, did interfere, but coupling the detectors to a chromatographic column with air as the carrier gas would overcome this difficulty. (Author abstract modified)

18845 APTIC NO. 37683

Atkins, Patrick R.

THE C(12)/C(13) RATIO AS AN INDICATOR OF AIR POLLUTION. *Isotop. Radiat. Technol., 8(4):381-385, 1971. 15 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., Dec. 1970, Paper CP 37C.)*

The use of stable isotopes of atmospheric constituents as natural tracers of pollutants and as indicators of general levels of pollution was investigated. Carbon dioxide samples were collected by freeze-out and precipitation procedures and the C(12)/C(13) ratios of the samples were determined. The ratio in atmospheric CO2 was calculated in several field tests and provided information about both the degree and influences of major sources of pollution in specified areas. Freeze-out sampling was less convenient but more reliable and probably more accurate than precipitation. The results of tests in Austin and Houston, Tex., on samples taken in traffic conditions and in a brewery, oil refinery, and steel mill are tabulated. Similar studies of nitrogen, oxygen, and sulfur could give information about the sources of sulfur oxides and nitrogen oxides present in polluted air. (Author abstract modified)

18846 APTIC NO. 37657

Attmannspacher, W.

A SIMPLE, LOW-INERTIA DEVICE FOR MEASUREMENT OF GROUND-LEVEL ATMOSPHERE OZONE BY MEANS OF CHEMICAL SOLUTIONS. *(Ein einfaches, nasschemisches Geraet mit geringer Traegheit zur Messung des bodennahen Ozons der Atmosphaere). Text in German. Meteorol. Rdsch., 24(6):183-188, Nov./Dec. 1971. 9 refs.*

The operating principles and the construction of a low-inertia instrument for ground-level ozone measurements are described. Ozone density can be measured practically on a linear scale between 0-1000 micrograms/cu m. To check the usability of the device, two instruments were operated in parallel over a five-week period. The correlation coefficient for mean hourly values was 0.998; the difference in mean values over the whole period was 0.46 micrograms/cu m.

18847 APTIC NO. 37654

Aue, Walter A. and Pankaj M. Teli

SAMPLING OF AIR POLLUTANTS WITH SUPPORT-BONDED CHROMATOGRAPHIC PHASES. *J. Chromatog., 62(1):15-27, Oct. 28, 1971. 21 refs. (Presented at the Annual Conference on Trace Substances in Environmental Health, 5th, Columbia, Mo., June 1971.)*

Support-bonded materials can be used to trap organic vapors from the atmosphere. The trapped compounds can then be extracted and the concentrated extracts analyzed by various analytical techniques. The unique characteristics of heavy loads of support bonded silicones -- long retention times in gas chromatography, short retention times in liquid chromatography, and, of course, their non-extractability -- make them excellent candidates for such a task. Gasoline and car exhaust sampling was performed mainly to indicate the volatility range subject to collection. Since atmospheres containing known levels of chlorinated hydrocarbon insecticides are difficult to control, a number of these compounds were introduced into a fast air stream and collected. A number of air samples were also collected in Columbia and St. Louis, Missouri. Apparatus, Experimental results, and problems are considered. (Author summary modified)

18848 APTIC NO. 37253

Bavika, L. I. and L. S. Shinkarenko

DETERMINATION OF SULFURIC ACID IN AIR BY A VANADATE METHOD. *(Opredeleniye sernoy kisloty v vozdukhe vanadatnym metodom). Text in Russian. Neftepererab. Neftekhim., 9:40-41, 1971. 5 refs.*

Sulfuric acid in air was determined by passing air (0.5-1 l/min) through distilled water to which an 0.5% ammonium vanadate solution was added. The vanadate solution reacted with H2S04 to form a yellow color whose intensity was a linear function of H2S04 concentration and was stable for longer than 10 days. The sensitivity was 0.005 mg H2S04 in 5.5 ml solution and the average error was 9.3%.

18849 APTIC NO. 37601

Becker, Herbert

THE DETECTION OF AIR POLLUTANTS WITH TUNABLE LASERS. *(Der Nachweis von Luftfremdstoffen mit abstimmbaren Lasern). Text in German. Umwelt (Duesseldorf), 2(1):45-46, Feb./March 1972. 4 refs.*

Several lasers are available which can be tuned to a certain wave length in the infrared spectrum range such as the diode laser consisting of the semiconducter Pb 1-xSnxTe. By variating the variable x which determines the lead and tin content, the wave length of the radiation emitted by this laser can be tuned within 6.5 micron to 32 micron. Such lasers are suitable for detecting certain air pollutants. They are not suitable for measuring carbon monoxide and nitric oxide. The spin flip-Raman-laser which is tunable over a wide range of wave lengths seems to be more promising as far as measuring air pollutants is concerned. In the U. S., a measurement unit using a spin-flip-Raman laser as the radiation source has been developed. It can be tuned to wave lengths from 5 to 6 micron and from 9 to 16 micron. The gas sample is drawn into a measuring cell. After tuning the laser, the sample is irradiated. The component which is to be measured absorbs electromagnetic energy. Consequently, the temperature and pressure increase in the measuring cell. The pressure increase is proportional to the concentration of the component. The measuring unit is highly sensitive so that nitric oxide concentrations in the range of 0.1 to 10 ppm can be determined.

18850 APTIC NO. 37424

Benarie, M. and A. Nonat

PRELIMINARY TREATMENT OF FIBER FILTER FABRICS UTILIZED IN SAMPLING AND ANALYSIS OF SULFURIC ACID AEROSOL IN THE AIR. *(Traitement preliminaire des filtres en fibres de verre utilses pour le prelevement et le dosage de l aerosol d acide sulfurique de l atmosphere). Text in French. Atmos. Environ., 6(1):45-46, Jan. 1972. 3 refs.*

Sulfuric acid aerosols present in the air are usually collected on glass fiber filters. Quite often the fibers of these filters irreversibly fix some H2S04. These losses can be avoided by first rinsing the filters with normal sulfuric acid and then eliminating the excess by drying the filters at 235 C for 15 days in a Petri dish having a few drops of sodium hydroxide on the lid. Amounts of acid recovered from filters impregnated with known amounts of acid are listed.

18851 APTIC NO. 37584

Betz, Erwin C.

IMPURITY DETECTOR FOR GASEOUS STREAMS. *(Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,567,394. 4p., March 2, 1971. 3 refs. (Appl. May 16, 1968, 3 claims).*

The multi-column gas chromatographs generally used to detect impurities in a gaseous atmosphere require considerable floor space, close operating control and skill, and long sample probes. The invention provides a small, simple, and reliable instrument for transporting, measuring, indicating and/or recording continuously the impurity concentration in a gaseous stream. A known impurity stream and an unknown impurity stream are passed through parallel conversion zones, preferably catalytic, to produce separate conversion product streams. The product streams are then passed through detectors that generate signals which correlate quantitatively with the impurity content of the unknown stream. Suitable catalysts are metal oxides, e.g., copper oxide; suitable detectors are thermal conductivity cells, infrared analyzers, and hydrogen flame ionization detectors. Applications of the instrument include the detection of hydrocarbons in exhaust gases from drying ovens, vents from paint and varnish applications, catalyst regeneration facilities, and internal combustion engines. The performance of control devices for these exhaust streams can be evaluated with the instrument.

18852 APTIC NO. 37552

Bourbon, P., R. Malbosc, M. -J. Bel, F. Roufiol, and J. -F. Rouzaud

CONTRIBUTION TO SPECIFIC DETERMINATION SULPHUR DIOXIDE IN THE ATMOSPHERE. *(Contribution a la determination specifique dans l atmosphere du dioxyde de soufre). Text in French. Pollut. Atmos. (Paris), 13(52):271-275, Oct./Dec. 1971. 7 refs.*

A method is described for determining sulfur dioxide in the presence of acids (sulfur trioxide, nitrous vapors, hydrochloric acid); sulfur (hydrogen sulfide, methyl mercaptans); and alkalines (ammonia). The method is based on the Bodecker reaction which permits the characterization, through a brick-red precipitate, of sulfites in the presence of potassium nitroprussiate and zinc salts. In the method, SO2 is absorbed by a molar solution of zinc acetate deposited on a dry filter and then determined by one of two colorimetric methods. Use of the zinc acetate solution enables the specific determination of H2S as well as SO2 in polluted air. The sensitivity of the method is 2.5 micrograms SO2 in 10 ml of solution, while the precision of the colorimetric determination is 3%. Results obtained by this method at several industrial and urban sites are compared with those of other methods.

18853 APTIC NO. 37425

Brewer, Aubrey K.

METHOD AND MEANS FOR DETECTION OF MICROORGANISMS IN THE ATMOSPHERE. *(Assignee not given.) U. S. Pat. 3,566,114. 5p., Feb. 23, 1971. 4 refs. (Appl. April 25, 1968, 2 claims).*

Since there is no known method available for long range detection and identification of biological particulates within the atmosphere, a procedure is provided which requires only a few minutes for a reliable identification of bacteria in the atmosphere. A suitable ultraviolet light is directed into the atmosphere. The light is reflected back by nonliving substances, while living organisms such as bacteria become excited and produce fluorescent light. Apparatus is provided to receive and differentiate between the reflected and fluorescent light. Bacteria of different classes will produce their characteristic wavelength, and different classes of bacteria can then be determined. (Author abstract modified)

18854 APTIC NO. 37591

Brouwer, H. J., S. M. de Veer, and H. Zeekijk

THE SO2 MONITORING NETWORK IN THE RHINE ESTUARY REGION. *Philips Tech. Rev., 32(2):33-41, 1971. 7 refs.*

In the sulfur dioxide monitoring network now being operated in the Rhine estuary region of the Netherlands, SO2 is measured by continuous coulometric titration. Thirty-one monitors are connected by telephone lines to a computer; the monitors operate without supervision and require simple servicing once every 3 mo. A constant air stream is passed through a measuring cell containing a solution which includes free bromine. The SO2 in the air reacts with the bromine; the bromine content is replenished by an electrolysis current working through a feedback system. The current is a measure of the quantity of SO2 supplied per unit time. The computer receives a measuring signal, calibration signal, or a zero signal, depending on the position of a valve in the monitor; valve positions are controlled by the computer. The computer then calculates the SO2 concentration by comparing the various signals. The computer also corrects the measured concentrations for the effects of site, time, wind direction, and season. If the values should rise above a threshold limit determined by statistical calculations, an alert is signaled. (Author summary modified)

18855 APTIC NO. 37350

Buck, M. and G. Reusmann

A NEW SEMI-AUTOMATIC METHOD FOR FLUORIDE DETERMINATION IN PLANT AND AIR SAMPLES. *Fluoride, 4(1):5-15, Jan. 1971. 4 refs. (Presented at the International Society of Fluoride Research Conference, Annual, 3rd, Vienna, Austria, March 22-25, 1970.)*

A fluorine-specific electrode permits the electrometric (potentiometric) determination of fluorine in plants and air. An automated system incorporating the electrode and covering all stages of plant analysis from sample preparation to fluorine estimation and printout is schematically illustrated and described in detail. The standard deviation of the automated electrometric method is approximately 3% and significantly lower than that of the conventional photometric procedure. The automated system permits the number of analyses to be doubled compared with the manual electrometric procedure and, since the distillation stage is omitted, tripled in comparison with the photometric precedure. Substances other than F(-) do not interfere with the electrometric method. In the case of air samples containing nonsoluble F(-) compounds, the method yields lower values than photometric methods. It is, therefore, used to analyze the phytotoxic portion of F(-) compounds in air.

18856 APTIC NO. 37075

Chanin, Gerson, John R. Elwood, and Edward H. Chow

A SIMPLIFIED TECHNIC FOR ATMOSPHERIC H2S STUDIES. *Sewage Ind. Wastes, vol. 26:1217-1230, Oct. 1954. 6 refs. (Presented at the California Sewage and Industrial Wastes Association, Annual Meeting, 26th, Sacramento, Calif., May 5-8, 1954.)*

A relatively simple method for atmospheric hydrogen sulfide pollution studies is described which permits sampling of a large area in a short time with a minimum of manpower and equipment. In essence, the method consists of exposing specially prepared lead acetate test tiles to the atmosphere in question and following the degree of blackening of the tiles, which is proportional to the amount of H2S present. Some specific applications of the technique are described. The results of a field testing program to evaluate progress toward elimination of odor nuisance as a result of the initiation by the East Bay Municipal Utility District, Oakland, Calif., of a sewage treatment plant and intercepting sewer system are presented. (Author summary modified)

18857 APTIC NO. 37228

Chisaka, F., I. Shimada, S. Yanagihara, and T. Suzuki

ANALYSES OF OXIDANTS. *(Okishidanto no bunseki). Text in Japanese. Preprint, Ministry of International Trade and Industry, Tokyo (Japan), Government Mechanical Research Lab., p. 18, 1971. (Presented at the Meeting Government of the Mechanical Research Laboratory, Tokyo, Japan, Dec. 16, 1971.)*

The most outstanding characteristic of the Los Angeles-type photochemical smog is the irritation of the eye and nose membranes by oxidants. Oxidants contain ozones, peroxyacetyl nitrate, peroxybenzoyl nitrate, and peroxypropionyl nitrate; their chemical properties, the types of plant damages, and the degree of eye irrtation are extremely different. In order to determine and differentiate properties of each element, high purity test materials are required. Various synthetic and refining methods of oxidants were examined. When hydrocarbons and nitric oxide were made to react to ozones in a plastic bag, isobutene mainly yielded peroxyacetyl nitrate and butene-1 formed PPN (peroxylpropinol nitrate). These were condensed and separated by gas chromatography and infrared spectrometry was applied. In addition, the stability of PAN in the air was investigated.

18858 APTIC NO. 37470

Christian, C. M., II and J. W. Robinson

THE DIRECT DETERMINATION OF CADMIUM AND MERCURY IN THE ATMOSPHERE. *Anal. Chim. Acta, 56(3):466-470, Oct. 1971. 6 refs.*

In order to eliminate the time-consuming problems and numerous interferences of most of the recorded methods for the determination of mercury or cadmium in the atmosphere, a spectrophotometric instrument previously reported for the determination of lead in the atmosphere was modified for the determination of mercury and cadmium. A commercial Barnes demountable hollow-cathode lamp was used to provide a strong steady signal. Charcoal was used as a pre-scrubbing agent to supply zero air for calibration purposes. Laboratory air samples were drawn into the instrument on various days and the resultant absorptions were measured. Based on the calibration curves, the concentrations of mercury and cadmium in the ambient atmosphere were determined. Interference studies were performed. The lower limit of sensitivity appears to be 1.2 micrograms/cu m and 0.02 micrograms/cu m for mercury and cadmium, respectively.

18859 APTIC NO. 37066

Ciuhandu, Gheorghe and Gheorghe Krall

PHOTOMETRIC DETERMINATION OF TRACES OF CARBON MONOXIDE IN HYDROGEN. *(Photometrische Bestimmung von Kohlenmonoxydspuren in Wasserstoff). Text in German. Z. Anal. Chem., 172(2):81-87, Jan. 1960. 8 refs.*

A sensitive method for the quantitative determination of carbon monoxide traces in an excess of hydrogen passes the gas through an ice-cooled alkaline solution of the silver salt of p-sulfamidobenzoic acid. Under these conditions, the reducing power of hydrogen towards the silver salt is completely neutralized, while that of CO persists even at very low temperature and is manifested by a yellow or brown coloring. The CO concentration is derived at constant pressure from the volume of the gas sample passed through the reagent solution and from the extinction module of the silver salt formed. Photometric determination of the intensity of light absorption takes place approximately at 420 millimicrons. Trace quantities of 0.001-0.5% CO can thus be determined.

18860 APTIC NO. 37308

Cook, W. G. and R. A. Ross

GAS-CHROMATOGRAPHIC SEPARATION OF HYDROGEN SULFIDE, AIR, AND WATER. *Anal. Chem., 44(3):641-642, March 1972. 8 refs.*

A Porapak Q column linked to a Carbowax column was used for the gas-chromatographic separation of hydrogen sulfide from water- saturated air and water samples containing dissolved H2S. The gas samples analyzed were either synthetic or extracted directly from the main stack in the chemical recovery plant of a Kraft pulp mill. For both separations the injection inlet temperature was 120 C, the column compartment was 125 C, and the detector compartment was 175 C. The hot-wire current was kept at 150 mA with a recorder span of 1 mV for all samples. The minimum detectable concentration of H2S was about 50 ppm v/v. This procedure offers a rapid analysis time and definite separation of components without the need for temperature programming or cold traps.

18861 APTIC NO. 37110

Deininger, Nicholas and Russell W. McKinley

THE DESIGN, CONSTRUCTION, AND USE OF AN ODOR TEST ROOM. *Am. Soc. Testing Mater. Spec. Tech. Publ., no. 164:23-32, 1954. 3 refs. (Presented at the American Society for Testing Materials, Annual Meeting, 57th, Chicago, Ill., June 15, 1954.)*

In many experimental and research projects involving odor evaluation and measurement, there is the need for a suitable enclosed space in which to conduct panel tests and to simulate actual conditions as realistically as possible. Two primary factors govern the minimum size of the test room: it must be large enough to permit measurable odorant introductions to be made with a minimum of preparation and manipulation, and must be able to accommodate comfortably four to six observers, as a group, during the tests. The test chamber is actually composed of two rooms, the antechamber and the examination room. Construction materials for an odor test room must contribute no interfering odors of their own and must be nonsorptive and nonreactive as well. The primary pieces of auxiliary equipment outside the test room are those used to meter microquantities of odorants in liquid, solid, or gaseous states. Room operation and test techniques must also be outlined.

18862 APTIC NO. 37511

Devonald, B. H., R. S. Serenius, and A. D. McIntyre

EVALUATION OF THE FLAME PHOTOMETRIC DETECTOR FOR ANALYSIS OF SULPHUR COMPOUNDS. *Pulp Paper Mag. Can. (Quebec), 73(3):50-53, March 1972. 3 refs. (Presented at the Canadian Pulp and Paper Association, Air and Stream Improvement Conference, 6th, Quebec, April 13-15, 1971, Paper T 68.)*

The Melpar flame photometric detector for gas chromatographic analysis of sulfur compounds in pulp mill gas process streams was evaluated. The odor associated with kraft pulp mills is caused primarily by hydrogen sulfide emitted from the chemical recovery furnace and by various alkyl sulfides created during delignification of wood by cooking with a sodium hydroxide-sodium sulfide solution. Non-sulfur organics, e.g., ketones, alcohols, and terpenes, frequently present in pulp mill gas process streams, do not interfere with the analysis as they do with a flame ionization detector. However, a major drawback is the limited dynamic range of the flame photometric detector, which necessitates sample dilution for gases containing high concentrations of sulfur compounds. In addition, the high back pressure of the column used in the initial work (38 psi) resulted in frequent leaks in the apparatus. The use of the flame photometric detector, in conjunction with a Microtek GC 2000R Chromatograph, for analysis of sulfur compounds in several process streams of pulp mills is described. (Author abstract modified)

18863 APTIC NO. 37218

Drasche, Heinz

HOW PRECISE IS THE SUBJECTIVE EVALUATION OF DUST CONCENTRATION? (Wie genau ist die subjektive Schaetzung von Staubkonzentrationen?). Text in German. Staub, Reinhaltung Luft, 31(12):490-492, Dec. 1971. 3 refs.

Dust concentrations at 49 working places in a large foundry were independently estimated by five foundry officials. The assessment was made according to the following categories: (1) very small amount of dust present; (2) unequivocally dusty atmosphere; and (3) intermediate between (1) and (2). The estimates were compared with gravimetric data unknown to the investigators. Concentrations above 100 mg/cu m were uniformly assigned to category (3). In the case of concentrations up to 50 mg/cu m, erroneous classifications prevailed. The average correlation factor was 0.379.

18864 APTIC NO. 37512

Fiorentina, H. Della

DUST GRANULOMETRY AS MEASURED ON THE WORKING PLACE. *(La granulometrie des poussieres aux postes de travail). Text in French. Cent. Belge Etude Doc. Eaux, 24(337):547-552, Dec. 1971.*

In solid aerosols, the fractions below 5 micron are most harmful, biologically, due to the high rates of retention. Sampling and granulometric analysis are most important in dust investigations in order to evaluate their toxicity. Different sampling methods are reviewed, such as impaction, filtration, precipitation, and sedimentation samplings. A great variety of methods can be applied in granulometric analysis. With immobile fluid methods a particle size range of 1-60 micron is covered. In Cascade Impactors, based on the elutriation method, a range of 0.7-20 micron can be analyzed. Optic microscopes are applicable for a granulometric range of 50-1 micron, while electron microscopes, combined often with automatic counting, are used for a range of 0.001-20 micron. Tyndalloscopes based on the light diffusion effect have many advantages. Also electronic counters exploiting the resistance variations of electrolytes due to particles are widely used. Analyses are made mostly in monodisperse solutions. Wide ranges of measurement, including fractions below 5 micron, and independence are the basic factors to be considered in choosing a specific type of equipment. As a result of a test of granulometric techniques, three different methods were found best. The Coulter counter, measuring the resistance of an electrolyte containing the dust particles when passing through a micro-orifice, has a lower counting limit of 0.5 micron. This method was relatively delicate. The 15-channel Royco 202 type equipment has direct digital display in a range of 0.3-10 micron with a counting speed of 30,000 particles/min. Morphologic analysis is not possible with the above techniques. The visual counting in the optic microscope, of dust sampled by impinger, has apparent errors and deficiencies. Analyses of different dust samples showed good accordance of values obtained by the Royco and Coulter type equipment, while the results delivered by microscope were highly different. Sampling method cannot be regarded as a main factor.

18865 APTIC NO. 37430

Fletcher, Taylor C.

NONMICROPHONIC INFRARED GAS ANALYZER. *(Dept. of the Navy) U. S. Pat. 3,566,106. 5p., Feb. 23, 1971. 2 refs. (Appl. Jan. 2, 1969, 3 claims).*

Carbon monoxide, nitric oxide, nitrogen dioxide, methane, and sulfur dioxide each absorb radiant energy in a narrow frequency band segment from incident broadband infrared energy. Attenuation of the narrow frequency band is related to the quantity of the compound in the path of the energy which in turn is related to the concentration of the substance along the path length of energy. A type of pneumatic detector cell which operates on the principles of the gas calorimeter is used to detect one selected substance, and a corresponding number of cells are used to monitor for several substances. When this type of detector is used on a vehicle in motion, sufficient microphonism results to virtually mask the signal. An infrared analyzer cell is described having at least two pockets of the same gas separated by a very thin sensitive diaphragm. Adjacent to the diaphragm and fixed to the cell housing to function with the diaphragm as a capacitor is an electrical element. Between the pockets is a slow leak path to preclude static pressure differential across the diaphragm. An infrared window is provided for transmitting energy in a predetermined energy band in the infrared portion of the spectrum to one of the gas pockets. The centroids of the two gas pockets are contiguous to minimize deflection of the diaphragm relative to the pockets of gas with vibration of the cell. (Author abstract modified)

18866 APTIC NO. 37469

Friedrichs, Karl-Heinz and Yash Paul Grover

THE DETERMINATION OF HEAVY METALS IN DUST SAMPLES OF ATMOSPHERIC AIR WITH THE ANNULAR KILN METHOD RING OVEN TECHNIQUE. *(Die Bestimmung von Schwermetallen in Staubproben aus der Aussenluft mit der Ringofen-Methode). Text in German. Staub, Reinhaltung Luft, 32(1):23-25, Jan. 1972. 8 refs.*

For measuring particle-shaped air pollutants in the external air, the tape sampler is frequently used. The evaluation of the dust spots obtained by this method is in most cases carried out by measuring the grey tone. Some substances can be determined by the ring oven technique. This method was used for the semiquantitative determination of heavy metal ions and of sulfuric acid. For sampling, a unit was used consisting of a filter frame, a vacuum pump, and a gas quantity measuring instrument. With respect to the dimensions of the ring oven (22 mm inner diameter of the heatable alu-block), a circular area of 8 mm in diameter was exposed for collecting the particles. At a throughput volume of 0.3 cu m/hr, the sampling speed was 1.66 m/sec. The sampling time was more than 30 min each time. The measurements were taken in a measuring station in Duesseldorf on weekdays at 9 am, at noon, and at 3 pm. By means of the ring oven technique, the Fe(III) ions were washed out after they had been converted to soluble FeCl3, and collected on the inner side of the ring oven where the solvent evaporated. An average iron concentration in the dust samples taken over the period February to May 1971 of 1.7 micron/cu m (standard deviation 0.84 micron/cu m) gas measured. The concentration fluctuated between 0.31 and 4.5 micron/cu m. These concentrations are comparable to test values obtained in the U. S. The nickel concentrations were below the indication limit of this method. The sulfuric acid determination by the ring oven technique is based on a carbonization of the cellulose which creates a black/brown ring. The filter structure is changed by the carbonization; at higher sulfuric acid concentrations, it is destroyed entirely so that a microphotometric evaluation is no longer feasible. Moreover, interferences by orthophosphoric acid (H3PO4) and by ammonium sulfate (NH4)2SO4 could not be avoided.

18867 APTIC NO. 37443

Fuzie, Kimika

THE LUNDGREN IMPACTOR FOR DETERMINATION OF AEROSOL PARTICLES. *(Lundgren inpakuta ni yoru earozoru no sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):100, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The determination of aerosols by a Lundgren impactor has been used to obtain data on particle concentration as a function of particle size and components. This impactor, which has been developed for the U. S. Public Health Service, is cylindrical with 4 steps of collecting drums. Teflon film of 0.3 mm thick coated with silicon grease DC 200 is used for collection. According to Lundgren, particle sizes of 50% cut point at 4 cfm flow velocity and 2 g/cu cm particle density, are 10, 3, 1 and 0.3 micron for 4 steps. The flow velocity can be changed from 0.5 to 7 cfm; 24 hrs sampling at 5 cfm for 150 micrograms/cu m of air collects approximately 30 mg of particles.

18868 APTIC NO. 37513

Graeve, J. de

THE USE OF NEUTRON ACTIVATION IN AIR POLLUTANT ANALYSIS. *(L utilisation de l activation neutronique a l analyse des polluants de l air). Text in French. Cent. Belge Etude Doc. Eaux, 24(337):535-546, Dec. 1971. 5 refs.*

General principles of radioactive pollutant analysis, and examples of its utilization are described. In the irradiation, neutron sources delivering slow neutrons with a mean energy of 1 EV are applied. The counting system consists of a detection system including a scintillation counter, a semi-conductor counter, and an analyzer system. The advantages involved in the neutron activation are adjustable sensibility, high selectivity, and the possibility of automation. No chemicals are needed, and non destructive analysis is possible in most cases. To determine the dispersion and evolution of air pollutants, a radioactive isotope, mostly antimony powder, is injected into the flue gas leaving the stack. The dilution coefficient can be determined from samples taken by means of filters. Problems and possible solutions in neutron activation techniques are described on examples. In one case, the 32S/24S ratios were determined to detect and identify the pollutant. Air pollution monitorings were carried out, using metallic elements (Japan, Cincinnati (Ohio)). In Columbia (Missouri), concentrations of different elements were determined in samples of 7-20 cu m. Fully automatic detection and identification of 33 elements present in air was carried out in a computerized system in the U. S. A.

18869 APTIC NO. 36959

Grimmer, Gernot

CARCINOGENIC HYDROCARBONS IN THE ENVIRONMENT OF MAN. *(Cancerogene Kohlenwasserstoffe in der Umgebung des Menschen). Text in German. Erdoel Kohle (Hamburg), 19(8):578-583, Aug. 1966. 10 refs. (Presented at the Deutschen Gesellschaft fuer Mineralolwissenschaft und Kohlechemie, Annual Meeting, 17th, West Germany, Oct. 7, 1965.)*

A method for determining 0.1 microgram per g of carcinogenic hydrocarbons in foods or dusts is described in which samples are extracted with solvent systems such as methanol-cyclohexane or cyclohexane-dimethylformamide-water. The extract is then enriched by silicagel column chromatography and preparative two-phase paper chromatography. Separation of individual hydrocarbons occurs on aluminum oxide columns. Analysis of 3,4-benzpyrene and other aromatic hydrocarbons in lettuce, curly kale, spinach, and tomatoes using this method showed the highest 3,4-benzpyrene levels in curly kale leaves. Lettuce contained 2.8 to 12.8 microgram/g and curly kale, 12.6 to 24.5 microgram/kg. Tomatoes had the lowest benzpyrene content (0.22 microgram/kg), because of their smooth surface. Cereal grains contained 0.2-4.1 microgram/kg levels almost completely preserved in the flour and bread samples prepared from these grains. Washing the samples with water produced only minor reductions of the benzpyrene levels because of the low water solubility of the surface soot layer. Cereal samples from the Ruhr region had hydrocarbon levels 10 times greater than samples from non-industrial areas. Air samples from Bonn, Duesseldorf, and Bochum showed 3,4-benzpyrene levels of 133, 125 and 244 microgram/1,000 cu m in February. Assuming that a person utilizes 10 cu m air/24 hr, the daily intake of 3,4-benzpyrene would be 1.0-3.0 microgram for an inhabitant of these cities.

18870 APTIC NO. 37655

Grob, K. and G. Grob

GAS-LIQUID CHROMATOGRAPHIC-MASS SPECTROMETRIC INVESTIGATION OF C6- C20 ORGANIC COMPOUNDS IN AN URBAN ATMOSPHERE. AN APPLICATION OF ULTRA TRACE ANALYSIS ON CAPILLARY COLUMNS. *J. Chromatog., 62(1): 1-13, Oct. 28, 1971. 21 refs.*

Qualitative and quantitative investigations were made on the carbon-6 to carbon-20 volatile organic substances in the air of Zurich, Switzerland. The technique of trace analysis on high resolution capillary columns was developed further and, to trap organics, a specially designed filter was used containing 25 mg of cigarette filter charcoal. Important information about the adsorption/desorption mechanism was obtained by using two or more filters in series. The extraction of the filters with carbon disulfide is described. A mass spectrometer specially designed to meet the requirements of coupling with high resolution gas chromatography was used. The majority of the hundred and eight substances identified were aliphatic and aromatic hydrocarbons. Among substances representing other groups were benzaldehyde and several of its alkyl derivatives which may be oxidation products of aromatic hydrocarbons. (Author summary modified)

18871 APTIC NO. 37596

Hashmi, Manzur-ul-Haque and Farhat Rafique Chughtai

SEMIQUANTITATIVE DETERMINATION OF THIRTY CATIONS BY CIRCULAR THIN-LAYER CHROMATOGRAPHY. *Mikrochim. Acta, no. 6:924-937, 1971. 11 refs.*

A comprehensive scheme for the semiquantitative determination of 30 metal ions from 0.5 ml of unknown solution which may contain up to 46 cations, based on circular thin-layer chromatography, is described. The cations, prior to analysis, were divided into six different groups by solvent extraction. Each cation was determined separately with different spray reagents and the mean error was calculated. Analysis of the same ions with different reagents provided a useful check. The error has been minized to plus or minus 5% and the procedure is rapid, simple, and economical. The method applies to the microgram range and has potential for the determination of airborne particles and of trace elements in blood, tissue, and bone.

18872 APTIC NO. 37108

Hatch, Theodore and Sarah P. Choate

STATISTICAL DESCRIPTION OF THE SIZE PROPERTIES OF NON-UNIFORM PARTICULATE SUBSTANCES. *J. Franklin Inst., vol. 207:369-387, 1929. 15 refs.*

As determined theoretically and in experiments with quartz, calcite crystals, and granite dust, size properties (surface area and volume) of nonuniform particulate substances are closely correlated with the statistical parameters M g and sigma g of the log probability curves, followed by the size-frequency distributions of such materials. This manner of defining particle size possesses certain advantages over the use of the average diameters Delta and D. The advantages are that the two statistical parameters define one and only one size-frequency distribution curve, give all information concerning particle size obtainable from Delta and D, and provide information concerning size-distribution and relative frequency of certain sizes.

18873 APTIC NO. 37466

Hayashi, Miyoko

ANALYSIS OF PLASTICIZERS BY GASCHROMATOGRAPHY. *(Gasu kuromatogurafi ni yoru kasozai no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):102, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Plasticizer used during the processing of vinyl chloride resin was analyzed by means of gas chromatography; the vapor released from the plasticizers is one of the main sources of irritative gases. The sample is collected at a velocity of 30 l/min through impinger tubes with alcohol, which is analyzed by rising temperature gas chromatography (50 to 250 C; 20 C rise/min) for several plasticizers. In addition, the difference in analysis before and after the concentration of samples is examined. The concentration up to 10 times does not influence the result for plasticizers. Thus, samples can be concentrated before analysis by increasing temperature gas chromatography, so as to obtain better results.

18874 APTIC NO. 370540

Herrick, Robert A.

AIR POLLUTION TESTING IN THE METALS INDUSTRY. *Instr. Metals Ind., vol. 21:IV-2-1 to IV-2-7, 1971. 9 refs. (Presented at the Instrumentation Society of America, Metals Industries Instrumentation Symposium, 21st, Baltimore, Md., March 23-25, 1971.)*

The adoption of stringent air pollution control regulations across the United States has created increased interest in the evaluation of stack emissions in the metals industry. There are three basic purposes for acquiring measurement data: to define compliance or non-compliance with regulatory requirements; to develop data for the design of control equipment; and to evaluate the performance of operating control equipment. At the present time, nearly all measurement data are obtained by manual testing rather than by automatic instrumental methods. The potential for improved air pollution emission testing instrumentation is discussed. The air pollutants of greatest concern in the metals industry are particulate matter and acid gases such as sulfur dioxide. Procedures for testing emissions are described, with special emphasis on the size fractionation of particulate emissions. (Author abstract modified)

18875 APTIC NO. 37321

Hirobe, H., K. Yoshida, M. Murata, T. Kanamaru, H. Shima, T. Matsui, K. Naka, T. Tsujikawa, T. Ishikawa, and K. Ishikawa

AIR POLLUTION IN YOKKAICHI. *(Yokkaichi no taiki osen (2)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):198, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

As a simple and accurate method of determining the atmospheric sulfur dioxide concentration, the following method was evaluated in comparison to the lead dioxide method and conductimetric method in Yokkaichi City. Samples were collected for ten minutes once every two weeks at the measuring point placed one/k sq m 5 by 7 km area, and determined by the p-rosaniline method. The average SO2 concentration in the total area was 0.03 ppm (as 1-hour value). The 0.03 ppm and 0.05 ppm isoconcentration lines were compared with those by the PbO2 method, though the latter was shifted toward eastern area, a similar tendency was shown. The correlation coefficient of some measuring points by the PbO2 method and the measuring point by the p-rosaniline method was gamma equals .794 (P equals 5%). The comparison with the conductimetric method indicated + or the 10% difference in two locations, however, the result was quite contrary at one location, which was presumably attributable to a minor difference in the measuring point.

18876 APTIC NO. 37699

Hoffman, Gerald L. and Robert A. Duce

COPPER CONTAMINATION OF ATMOSPHERIC PARTICULATE SAMPLES COLLECTED WITH GELMAN HURRICANE AIR SAMPLERS. *Environ. Sci. Technol., 5(11):1134-1136, Nov. 1971. 7 refs.*

Atmospheric particulate samples collected with Gelman Hurricane high-volume air samplers can be seriously contaminated with copper if special precautions are not taken to isolate the filter holder from the pump. The degree of contamination as a function of sampler type, shelter used, and meteorologic conditions during sampling was investigated. The copper contamination can easily be observed when samples are collected in the unpolluted marine atmosphere. The source is probably brush wear on the copper armature of the pump. Test results of samplers used under two different modes are tabulated. Copper contamination may also occur with other types of high-volume samplers used to collect atmospheric particulate matter and may make much of the previous data on atmospheric copper concentrations doubtful. (Author abstract modified)

18877 APTIC NO. 36945

Huls, Thomas A.

COMPLIANCE TESTING MEASUREMENT PROBLEMS. (INTRODUCTORY STATEMENT FOR ISA VEHICLE EMISSION MEASUREMENT PANEL DISCUSSION). *Preprint, Instrument Society of America, Pittsburgh, Pa., 6p., 1970. (Presented at the Instrument Society of America, Annual Conference, 25th, Philadelphia, Pa., Oct. 26-29, 1970.)*

The basic reason for proposing a change in the Federal motor vehicle compliance procedure for 1972 is to achieve direct measurement of the mass of emissions; there was also a desire to include startup emissions, have a closed self-weighting driving schedule, and use a better method for analyzing hydrocarbons. The constant volume sampler mixes the vehicle exhaust gas with a variable amount of air such that the total volume rate is constant. All the exhaust gas is contained in the flow stream which has a fixed volume flow rate. In such a stream the concentration of a constituent is directly related to the mass of the constituent. A continuous trace of the pollutant in the constant volume sampler flow stream becomes a continuous trace of the mass emitted from the vehicle exhaust. In the proposed compliance rule, the bag method is specified. Following the collection of the gas from the constant volume sampler in a bag, batch analysis methods such as wet chemistry, gas chromatography, and subtractive columns can be employed. Instrumentation is mentioned.

18878 APTIC NO. 37446

Izawa, Y., T. Shioyama, Y. Hirakawa, H. Higuchi, and T. Tanaka

DETECTION OF AIR POLLUTION BY LASER RADAR. *(Reza reda ni yoru taiki osen gasu no kenshutsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):104, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A method to determine the distribution of sulfur dioxide, nitric oxide, and carbon monoxide in the air by means of laser radar utilizing resonance dispersion was developed in order to replace the existing chemical method which requires a long time for determination and does not allow remote measurement. This laser radar utilizes pigment laser which allows oscillation over whole wavelengths from violet to infrared by using different kinds of pigments and selection of appropriate wavelength through the use of prism and diffraction grating. For sulfur dioxide, ethanol solution of rhodamine 6 G is used to obtain laser beam with 100 kw of peak output and 100 n sec of plus width. The signal receiver uses a multiplier correcting signal strength, analysis of pulse amplitude by comparison of electric potential, and time measurement by clock pulse to determine the concentration and the location of the gas instantly.

18879 APTIC NO. 37399

Jander, Klaus

MEASUREMENT OF SULFUR DIOXIDE EMISSION WITH THE URAS 1. *(Messung von Schwefeldioxid-Emissionen mit dem URAS 1). Text in German. Gesundh. Ingr., 93(2):52-56, Feb. 1972. 2 refs.*

The measurement principle of the URAS is based on the partial absorption of an infrared radiation by gases in the spectral range of about 2 to 15 micron. Thus, the unit can be used for the measurement of sulfur dioxide, carbon monoxide, ammonia, carbon dioxide, hydrogen chloride and many organic gases. The measurement is based on the non-dispersive method. Two rays are used: one for measurement and one for comparison. The great disadvantage of the URAS is the water interference during SO2 measurements. A comparison of the results obtained with the URAS and those obtained by Handan analysis revealed that the URAS produced too high values. A check of the calibration curves showed that they did not agree in the lower range, otherwise the URAS values agreed satisfactorily with the data obtained by the chemical Handan analysis.

18880 APTIC NO. 37622

Kahnwald, Helmut

DETERMINATION OF THE DUST CONCENTRATION. GUIDELINES AND MEASUREMENT UNITS FOR THE CONTROL OF DUST EMISSIONS. *(Staubgehaltsbestimmung. Richtlinien und Kontroll-Messgeraete fuer die Ueberwachung von Staubemissionen). Text in German. Arch. Tech. Messen, no. (2):39-40, Feb. 1972. 9 refs.*

A bibliography is presented of literature discussing the error in dust concentration measurements in flowing gases by a sampling technique not matched to the shape and size of the sampling probe. As shown by measurements and considerations described in the quoted literature, the magnitude of the error depends on the relationship between the speed of the sample flow to the speed of the main gas flow as well as on the grain size distribution and the density of the dust. The error decreases at a constant sampling ratio with decreasing density and finer grain sizes. A brief discussion of the guideline for uniform measuring and evaluation methods in the steel and iron industry is given. The guideline particularly considers the conditions in the iron industry but is also applicable for other industries A table gives a survey of the present state of the art of dust concentration measuring units. Only one of the units listed in the table permits quasi-continuous gravimetric dust measurement. All other units measure physical quantities which are in relationship to the dust concentration. Of the units listed in the table, only the optical smoke and dust density meter (based on extinction measurements) has been installed in various production plants, mostly boilers, for emission monitoring. All others are still in ths stage of laboratory testing. For uniform calibration of the optical smoke and dust density meters, a VDI guideline is being prepared.

18881 APTIC NO. 37063

Katz, S. H. and E. J. Talbert

INTENSITIES OF ODORS AND IRRITATING EFFECTS OF WARNING AGENTS FOR INFLAMMABLE AND POISONOUS GASES. *Bur. Mines Tech. Paper, no. 480, 36p., 1930. 9 refs.*

Measuring the intensities of odors and irritating effects of chemicals constituted one phase of an investigation of warning agents for fuel gas. Persons were subjected to various known concentrations of substances in air and their sense perception or reaction noted. Measurements with the odorimeter were made on 55 different materials, and great differences were observed in the concentrations of various chemicals required to produce a definite intensity of odor. For instance, 6.2 ppm of allyl amine were required for a very faint odor, whereas trinitrotertiarybutylxylene gave a very faint odor at one part in 20 billion parts of air. Nasal and eye irritations cannot be compared by ratios as were the odors. Mercaptans, thioethers, selenium compounds, and one member of the nitro compounds gave very faint odors at lower concentrations than members of other classes of chemicals. Other classes of compounds tested included hydrocarbons, alcohol, esters, aldehydes, amine, and halogenated ketones.

18882 APTIC NO. 37404

Kawahata, Masayuki

ATMOSPHERIC POLLUTION MEASUREMENT AND SURVEYS -- METHODS AND ANALYSIS. *Preprint, Dept. of Commerce, Washington, D. C. and Water Pollution Control Federation, on New Technology in the Solution of Practical Problems in Air and Water Pollution Control, Tokyo, Japan, Dec. 8, 1971.)*

The application of the condensation nuclei monitor and the physical nature of small particulates and their role in the environmental pollution problem are examined within the context of general atmospheric survey programs. A typical ambient air survey was conducted in an urban area to demonstrate the use of the condensation nuclei monitor in conjunction with measurements of hydrocarbons, sulfur dioxide, and meteorological factors. Monthly and hourly concentration averages are included. The condensation nuclei monitor in use for plume tracing, gaseous pollutant detection, and particle size determination and the lithium particle monitor are also examined.

18883 APTIC NO. 37519

Kuper, Gerhard

LASER-LIDAR, WHAT CAN IT REALLY ACCOMPLISH? (Laser-Lidar, was kann es wirklich)? Text in German. Umwelt (Duesseldorf), 2(1):40-43, Feb./March 1972. 5 refs.

The most important task of the light detection and ranging system (lidar) apart from meteorological measurements is the analysis of air pollutants. It is used for spotting polluters. In order to determine whether the returning signal has been produced by soot, aerosols, or inversion layers and in order to determine how much of a smoke plume is harmless water vapor and how much is pollutant, two laser beams are emitted shortly after each other. The frequency of one laser beam is shifted by temperature regulation of the ruby to the absorption band of hydrogen. Water vapor absorbs this laser beam more than the other. The difference of the two signals is a measure of the water vapor fraction. For qualitative and quantitative analysis of the gaseous components, the Raman effect is used. Since the quantum yield of the Raman laser is so low, the measurement of concentrations which represent the tolerance limit for man is not feasible. The simplest version of the laser-lidar comprises a laser as transmitter and a receiver with a photodiode or multiplier and a recording unit. For simple distance measurements up to about 10 km a pulse power of 5 to 10 MW suffices. Maximum pulse powers of 100 MW at a beam diameter of 10 mm are now achievable.

18884 APTIC NO. 37718

Larssen, Steinar, David S. Ensor, and Michael J. Pilat

RELATIONSHIP OF PLUME OPACITY TO THE PROPERTIES OF PARTICULATES EMITTED FROM KRAFT RECOVERY FURNACES. *Tappi, 55(1):88-92, Jan. 1972. 11 refs. (Presented at the Pulp and Paper Industry Technical Association Water and Air Conference., Boston, Mass., April 4-7, 1971.)*

The theoretical and measured relationships between the plume opacity (one minus the fraction of light transmitted through the plume) and the properties of the particulates emitted from a kraft recovery furnace are compared. The plume opacity (Ringelmann number) was measured downstream from an electrostatic precipitator with a Bailey smokemeter. The particle size distribution and the particulate mass concentration were simultaneously measured with a cascade impactor and an alundum thimble, respectively. A linear regression analysis of the measured data showed that over the Ringelmann number range of 0.85-3.0 there is a nearly linear relationship between the logarithm of the plume light transmittance and the aerosol mass concentration. This relationship enables the determination of the particle mass concentration from measured light transmittance within (90% confidence) a concentration of approximately plus or minus 0.05 grains/std dry cu ft of gas at 0.3 grains/std dry cu ft of gas and plus or minus 0.1 grains/std dy cu ft of gas at 2.0 grains/std dy ft of gas. The effects of particle size distribution, particle density, and stack-gas temperature on the correlation between plume opacity and particulate mass concentration are discussed.

18885 APTIC NO. 37124

Lee, James and Robert E. Jervis

DETECTION OF POLLUTANTS IN AIRBORNE PARTICULATES BY ACTIVATION ANALYSIS. *Trans.*

Am. Nucl. Soc., 11(1):50-51, June 1968. (Presented at the American Nuclear Society, Annual Meeting, Toronto, Ontario, June 10-13, 1968.)

Samples of airborne particulate matter, or dust, were collected around metropolitan Toronto, Canada, by sucking large volumes of air through Millipore filters, type AA; they were then transferred to small quartz vials for irradiation at a thermal-neutron flux of 1.7 times 10 to the 13th power n/(sq cm sec) for two to three days. Gamma spectrometric studies were made of the gross samples to identify some of the nuclides. Specific radiochemical separation procedures were used to determine most of the detected components quantitatively. The presence of detectable bromine, arsenic, mercury, and zinc, in particular, are of concern as pollutants of appreciable hazard to public health in some forms.

18886 APTIC NO. 37631

Levaggi, Dario A., Wayman Siu, Milton Feldstein, and Evaldo L. Kothny

QUANTITATIVE SEPARATION OF NITRIC OXIDE FROM NITROGEN DIOXIDE AT ATMOSPHERIC CONCENTRATION RANGES. *Environ. Sci. Technol., 6(3): 250-252, March 1972. 10 refs.*

Extensive experimental trials have shown that an absorber containing triethanolamine on firebrick is capable of quantitatively absorbing nitrogen dioxide from nitric oxide plus nitrogen dioxide mixtures in dilute gas streams. Various molecular sieves used for the same purpose showed either high NO generation from NO2 or retention of NO. Soda lime and ascarite showed large losses of NO from mixtures of NO and NO2. While these latter materials may be used to obtain an NO2-free stream of NO, they do not quantitatively allow passage of NO, and are useless for precise analytical work. The triethanolamine-firebrick absorber can be used for the direct quantitative analysis of NO at ambient air concentrations in any ratio of NO/NO2 from zero to infinity. (Author abstract)

18887 APTIC NO. 37281

Lowder, J. E., K. G. P. Sulzmann, and S. S. Penner

COMPARISON OF A MULTIPLE-SLIT CORRELATION SPECTROMETER WITH LASER ABSORPTION IN AIR-POLLUTANT DETECTION. *J. Quant. Spectro. Radiative Transfer, 11(12):1877-1879, Dec. 1971. 20 refs.*

A quantitative evaluation is presented of a multiple-slit correlation spectrometer and a tunable-laser absorption system for eight common molecular species (carbon monoxide, carbon dioxide, nitric oxide, nitrogen dioxide, nitrous oxide, hydrogen sulfide, sulfur dioxide, and ammonia). The polyatomic molecules are either linear or else may be approximated as symemetric tops. The integrated intensities of the strongest fundamental bands used in the calculations of absolute line strengths are given, together with the references used. The band locations and the strengths of the strongest lines in the P and R-branches at 290 K and at the normal boiling points are also listed. Results of the calculations of minimum detectable species concentrations at 290 K and at the respective boiling points for each species are given. Detectability with the laser absorption technique is about 10,000 times greater than that obtainable with a comparable multiple-slit correlation spectrometer. Sensitivity of detection is increased by increasing the laser-power output until the power becomes sufficiently high to depopulate the ground state of the absorber.

18888 APTIC NO. 37361

Lynch, Jeremiah R.

EVALUATION OF SIZE-SELECTIVE PRESAMPLERS: I. THEORETICAL CYCLONE AND ELUTRIATOR RELATIONSHIPS. *Am. Ind. Hyg. Assoc. J., 31(5):548- 551, Sept.- Oct. 1971. 9 refs.*

Relationships of airborne dust concentrations measured by cyclone and elutriator size-selective presamplers are presented. Cyclone efficiency is assumed to follow the Los Alamos criterion, and that of the elutriator the British Medical Research Council criterion. Cyclone-elutriator ratios are given for log-normally distributed aerosols with a count median diameter range of 0.1 to 11.0 micron and a mass median diameter range of 0.2 to 16 micron for geometric standard deviations of 1.1 to 3.0. For the usual heterogeneous industrial dust clouds, the ratio is 0.81 plus or minus 0.11. For these same dust clouds the cyclone passes from 2 to 75% of the total dust, and the elutriator from 4 to 81%. (Author abstract)

18889 APTIC NO. 37243

Mage, David T. and Jamshid Noghrey

TRUE ATMOSPHERIC POLLUTANT LEVELS BY USE OF TRANSFER FUNCTION FOR AN ANALYZER SYSTEM. *J. Air Pollution Control Assoc., 22(2):115- 118, Feb. 1972. 4 refs.*

Air pollution analyzers, because of inherent lags and response times, will not produce an exact record of pollutant concentrations. A method is described which takes into account the instrument delay and response and thus allows the more accurate analysis of true time variations of air quality. The method assumes that most air monitoring instruments can be treated as linear systems, each system having its own unique transfer function, i.e., the response of the system to a unit impulse excitation. This transfer function is applied to the recorded output to produce a record of the actual pollutant concentrations at the inlet to the system. The procedure is used with a carbon monoxide analyzer in the Bay Area Air Pollution Control District monitoring station in San Jose. The results show that variations in peak heights of more than 50% can exist between actual and recorded values. (Author abstract modified)

18890 APTIC NO. 37107

Malakhina, A. Ya., M. I. Til kov, and Yu. K. Shaposhnikov

PAPER CHROMATOGRAPHY OF POLYNUCLEAR AROMATIC HYDROCARBONS. *(Bumazhnaya khromatografiya poliyadernykh aromaticheskikh uglevodorodov). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(1-3):97-100, Jan.-March, 1971. 7 refs.*

NTIS: TT 71-50122

Acetone, benzene, or octane extracts of polynuclear aromatic hydrocarbons (PAH) in dusts at three aluminum works were separated by paper chromatography and analyzed by thin-layer chromatography or fluorometric spectroscopy. The following PAH were determined in dusts deposited in ventilation pipes during the manufacture of electrolytic aluminum: 20-methylcholanthrene, 3,4-benzypyrene, 1,2-benzpyrene, 1,2-benzanthracene, 1,3,3,4-dibenzanthracene, 9,10-dimethyl-1,2-bezanthracene, and anthracene. The compounds were quantitatively determined by cutting out chromatogram spots and eluting them into a solution followed by fluorometric analysis. The 3,4-benzpyrene concentrations in 1-gram dust samples from the three plants were 0.051, 0.039, and 0.042 mg, respectively. The method is also applicable to investigations of PAH in gaseous discharges and effluents.

18891 APTIC NO. 37708

Marsoner, H. J.

THE DIRECT MEASUREMENT OF THE CO2 PARTIAL PRESSURE IN LIQUIDS AND GASES. *(Die direkte Messung des CO2-Partialdruckes in Fluessigkeiten und Gasen). Text in German. Arch. Tech. Messen, no. 35-38, Feb. 1972. 9 refs.*

The carbon dioxide partial pressure can be directly measured by an electrode. The measurement principle is based on the change of the pH value of the electrolyte by diffusion of CO2 into a diluted bicarbonate solution. A membrane between the sample and the electrode solution is selective for CO2 and passes no other gases which could change the pH value. The design of the electrode is shown in an illustration. A glass electrode surrounded by a chlorinated silver capsule as a reference electrode dips into a plastic bag made of teflon foil which is filled with sodium bicarbonate. The voltage between the glass electrode and the reference electrode is measured, and thus the pH value is measured. The CO2 diffuses into the electrolyte through the teflon memebrane. The calibration curve of the CO2 electrode is the same for all liquids and gases, including blood. The CO2 electrode requires a certain time until the equilibrium between the sample and the electrolyte is reached and until the reaction of the participating ions has come to an end. This time depends on the strength of the teflon membrane, on the strength and type of the stabilizing layer, on the bicarbonate concentration and on the properties of the pH gas electrode. The constant temperature of the sample, CO2 electrode, and reference electrode must be maintained in order to obtain accurate results.

18892 APTIC NO. 37479

McFee, D. R. and R. R. Bechtold

PYROLYZER-MICROCOULOMB DETECTOR SYSTEM FOR MEASUREMENT OF TOXICANTS. *Am. Ind. Hyg. Assoc. J., 32(11):766-770, Nov. 1971. 4 refs.*

A pyrolyzer and a microcoulomb detector (Mast Ozone Meter) connected in series were evaluated as a direct-reading air sampling instrument. Among the features of this system is the new method for measuring certain halogenated hydrocarbons in concentrations well below 1 ppm with direct readout capability. The pyrolyzer decomposes certain halogenated hydrocarbons to compounds that can be measured by the microcoulomb detector which uses polarization. The system has been used for in-place testing of charcoal filters with methyl iodide. Application of the system to testing for a variety of halogenated hydrocarbons gave lower limits of detection ranging from 2 ppb for methyl iodide to 900 ppb for tetrachlorodifluoroethane. The system was found to be insensitive to benzyl chloride and to 54% chlorinated diphenyls. (Author abstract modified)

18893 APTIC NO. 37232

Mizutani, Hiroo and Morihiko Hayakawa

EFFECTS OF OTHER GASEOUS ATMOSPHERIC POLLUTANTS ON SO2 VALUE BY PBO2 METHOD. *(Nisankaen-ho ni yoru SO2-chi ni okeru ta no taiki osen busshitsu no eikyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):61, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of atmospheric gaseous pollutants, such as nitrogen oxides and hydrogen sulfide, which react with lead dioxide to reduce the rate of collecting sulfur dioxide, on sulfur dioxide concentration obtained by the lead dioxide method were examined. After sample cylinders of lead dioxide, which had been exposed to nitrogen dioxide or hydrogen sulfide as well as unpolluted cylinders were left at polluted sites for a month, the amounts of sulfate, nitrate, and sulfide formed were determined. The more the samples reacted with nitrogen dioxide, the less sulfur oxides were caught by the cylinders. As a result, approximately an average of 10% in the collection rate could be reduced for the air in this area. The more the samples reacted with hydrogen sulfide, the more lead sulfate was found. Thus, hydrogen sulfide increases the sulfur dioxide concentration determined by lead dioxide method.

18894 APTIC NO. 37463

Mori, Masaki, Shonosuke Ito, Hiroshi Ogino, and Hiroyoshi Morita

FLUORIDE ANALYZER IN STACK GAS. *(Konodo fukkabutsu jido kirokukei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):99, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

An instrument to determine hydrogen fluoride in stack gas up to 2.0 ppm was developed. Sample gas flows at 10 l/min through a filter into the absorption section where it contacts with a buffer solution with a pH of approximately 5.5, which is fed there at 1 ml/min. The buffer solution absorbs the HF and is led into a measuring cell, where the concentration of the gas is determined by means of a fluoride ion electrode and a comparative electrode. The scale of a recorder is made linear to the gas concentration through inverse logarithm amplifier. The response time to 90% indication is approximately 2 min for about 1.5 ppm HF.

18895 APTIC NO. 37317

Morrow, Norman L., Richard S. Brief, and Rene R. Bertrand

SAMPLING AND ANALYZING AIR POLLUTION SOURCES. *Chem. Eng., 79(2):84-98, Jan. 24, 1972. 14 refs.*

With the immense emphasis now placed on eliminating and reducing air pollution from stationary sources, it is increasingly important to be able to analyze for various pollutants in these sources. A complete stack-sampling program requires determination of the concentration and characteristics of contaminants, as well as determination of the associated gas flow. Most statuatory limitations require mass rates of emission; both concentration and volumetric data, are therefore required. The most widely accepted or most promising and analytical techniques for measuring major pollutants are reviewed and evaluated. The pollutants considered are carbon monoxide, sulfur compounds (sulfur dioxide, sulfur trioxide, hydrogen sulfide, and mercaptans), nitrogen oxides, hydrocarbons, and particulates. Components of common sampling trains for particles and sulfur oxides are illustrated and nitrogen oxide and SO2 monitors are listed together with their manufacturers. Gas and particulate sampling, sampling probes, Orsat analyses, gas chromatography, electrochemical methods, photometric methods, spectrometry, flame ionization detectors, conductometric methods, and chemiluminescent detectors are mentioned.

18896 APTIC NO. 37600

Muramatsu, Fumio and Yasuji Himi

ANALYSIS OF HEAVY METALS IN ATMOSPHERIC SUSPENDED DUST (REPORT 2) DETERMINATION OF MN, CA BY FLUORESCENT X-RAY ANALYSIS USING VACUUM EVAPORATION STANDARD. *(Fuyu baijinchu no jukinzoku no bunseki (dainiho) Shinku joki hyojun shiryo o mochiita Mn, Cu no keiko X-sen bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):92, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Determination of manganese and copper in air-borne dust by means of fluorescent X-ray analysis was performed. Standards were made by attaching film of manganese and copper, through evaporation in vacuum, on glass fiber filters used for high volume air samplers. Calibration curves for both metals were obtained, using a fluorescent X-ray analyzer; they showed good stability. In addition, both metals in the standards were determined by means of atomic absorption spectrophotometry. Comparisons between actual measurements of both metals in Kanagawa-Prefecture using this method and atomic absorption spectrophotometry were made to see that both values were in good agreement.

18897 APTIC NO. 36916

Nagai, Takeshi, Tomo Hattori, Takao Nagano, and Yoshifumi Ukijima

STUDY OF THE INFLUENCE OF HYDROGEN SULFIDE (I). A SIMPLE METHOD FOR THE HYDROGEN

SULFIDE PAPER BADGE. *(Ryuka suiso no eikyo ni kansuru kenkyu daiippo, kenchi bacchi ni yoru ryuka suiso no kani sokutei. Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6 (1):77, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A simpler and less expensive, although less accurate, method than conventional ones to determine hydrogen sulfide was developed. Filter papers were immersed in solutions of different concentrations of silver nitrate, lead nitrate, and lead acetate and solutions alkalized with ammonium carbonate and dried in air When these papers were exposed to hydrogen sulfide of 4.25 ppm for one hour, papers immersed in 5% lead acetate solution (without alkalization) gave best result. In addition, this lead acetate paper gave a distinct change in color with hydrogen sulfide concentration changes, had good reproducibility of color, and were not disrupted by methyl mercaptan, sulfur dioxide, and direct sunlight.

18898 APTIC NO. 37438

Nebesar, Boris

SPECIALIZED INSTRUMENTS FOR THE DETERMINATION OF SULFUR BY THE COMBUSTION METHOD -- PART III. *J. Chem. Educ., 49(2):A63-A64, A66, A68, A70, A72, Feb. 16, 1972.*

Thermal conductivity and infrared absorption instruments for the determination of sulfur compounds such as sulfurdioxide by the combustion method are described. The main compartments of the Thermosulf are indicated. It comprises an oxygen supply, pressure regulator, magnetic control valve system, combustion chamber, dust and moisture trap, sulfur dioxide absorbent, flow regulator, cell, thermal detector, measuring circuit and operational amplifier, calibration potentiometer, and digital readout. The LEICO IR-32 automatic sulfur determinator, the dual instrument Infracarb S, and the Carsulmat which simultaneously determines sulfur and carbon in steels are described.

18899 APTIC NO. 37690

Oikawa, K., H. Maruyama, T. Iwai, and A. Murase

STATE ANALYSIS OF SUSPENDED PARTICULATE MATTER. NO. 1: ANALYSIS BY X-RAY SPECTROMETRY. *(Taikichu fuyu ryushi busshitsu no jotai bunseki ni kansuru kenkyu. Daiippo: X-sen kaisetsu no oyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):85, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Crystalline phase of metals in air-borne dust were determined by means of X-ray diffraction in order to consider the effect of metals on the environment and the origin of the dust. Samples were collected at 3 points in Kawasaki City for 3 to 4 consecutive days, mainly in Feb. 1971 by means of high-volume air samplers with glass fiber filters. Qualitative analysis of elements was carried out by a fluorescent X-ray spectrometer, and the chrystalline phase was determined by an X-ray diffractometer. Silicon dioxide alpha-quartz, sodium aluminasilicate, and hydrated calcium sulfate were abundant. In addition, alpha-ferric oxide, ammonium chloride, ferrosoferric oxide, and calcium carbonate were found.

18900 APTIC NO. 37514

Oka, K. and T. Fujii

ON THE CONTENTS OF ATMOSPHERIC ORGANIC LEAD IN URAN AREA. *(Taikichu no yukien no sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):97, 1971. 1 ref. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A method to determine atmospheric organic lead, such as tetraethyl lead used as an anti knock agent was examined. Samples were collected at 10 l/min for 5 to 7 days to suck approximately 100 cu m, of the air into activated carbon of 30 to 60 mesh in a scrubber. Inorganic lead particles were eliminated by glass fiber and membrane filters with a pore size of 0.45 micron. After wet oxidation extraction, lead was determined by the dithizone-benzene method. When lead fume, which is released by heating metal lead, was applied to this sampler, glass fiber and membrane filters collected 100% of particulate lead. The collection of organic lead by these two filters was negligible when the air involving organic lead, which is made from lead added to gasoline, was tested. An example of the measurements in Tokyo is given.

18901 APTIC NO. 36972

OKeeffe, Andrew E.

SAMPLING GASES FROM A HOSTILE ENVIRONMENT. *Preprint, Air Pollution Control Office, Research Triangle Park, N. C., Div. of Chemistry and Physics. 3p., 1971 (?). 5 refs.*

A stack sampling device with provisions for the reproducible extraction of a sample and its delivery to an ambient level analytical instrument was tested in the laboratory. Nitrogen containing 950 ppm sulfur dioxide was passed through a 75-cm length of quartz tubing. A flame photometric sulfur dioxide analyzer (with associated pump) drew 200 ml/min of clear air through a poly(tetrafluroethylene) tube suspended along the axis of the quartz tube. A 10 cm segment of the assembly was maintained at 250 C by enclosing it in a tubular combustion furnace. Under these conditions, the air sample delivered to the analyzer contained a constant and reproductible 0.9 ppm SO2. Any stepwise changes in the concentration of SO2 entering the quartz tube were followed by corresponding changes in the output signal.

18902 APTIC NO. 37515

Okita, Toshiichi, Hiroshi Ogino, Masaki Mori, and Jinkichi Miyai

AN ATMOSPHERIC HYDROGEN FLUORIDE RECORDER ON THE FLUORIDE ION ELECTRODE. *(Taikichu fukka suiso jido kirokukei - Fusso ion denkyoku ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):98, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The characteristics of the electrode potential of the fluoride ion electrode, which is a probe for an atmospheric hydrogen fluoride recorder, was examined. With an increase in the concentration of the pH buffer solution, which is used to buffer the effect of sodium carbonate collecting hydrogen fluoride, the potential tends to be more stable, although its response becomes slower. When the ion strength is increased by the addition of sodium chloride, more stable potential and more rapid response are obtained. Carbonate ion of sodium carbonate does not interfere with the measurement. Ethyl alcohol is recommended for cleaning the electrode, the performance of which has deteriorated during its use.

18903 APTIC NO. 37608

Okubo, Y., K. Oikawa, and J. Kimura

ANALYSIS OF INORGANIC PARTICULATE MATTER NO. 3. MEASUREMENT OF ATMOSPHERIC PARTICULATE MATTER AND ITS METAL CONTENTS. *(Taikichu muki seibun ni kansuru kenkyu. Daisanpo. Fiyu funjin sokuteiho betsukinzoku seibun nodo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):93, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A short time collection method by a high volume air sampler was compared with a long term collection method by low volume sampler in order to find a better method to determine metal content in air- borne dust and to establish pollution patterns in an area. Samples were collected for 30 days; 24 hour collection by low volume sampler and 10 day collection by high volume sampler were performed. Filter papers on which samples were taken, were ashed in low temperature and underwent several acid treatments to produce sample solution, which were analyzed by means of atomic absorption spectrophotometry for cadmium, lead, manganese, and copper. Using the average values of 10 days for samples obtained by the high volume samplers, the amount of dust collected was higher in the samples by the high volume sampler. However, the concentration percentage of metals to the amount of dust was higher with the low volume sampler.

18904 APTIC NO. 37467

Okuda, Norio

TWO IMPROVED DEVICES FOR MEASURING WASTE GAS. *(Haigasu sokutei sochi no futatsu no kairyo koan ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):103, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Two improved devices relating to measurements of pollutants in waste gas are introduced. The analytic method of total sulfur oxides provided in JIS K0103 has several shortcomings: it is heavy; the measuring hole is far from the measuring device so that sulfuric acid and water in the gas are condensed; it is difficult to connect a sampling tube with an adapter; and it takes time to set up the sampling device. The present sampling device has a bottle to absorb gas with a by-pass inside and a union joint connected to the sampling hole of the duct. In order to facilitate the determination of measuring spots for the measurement of dust in flue gas provided in JIS 28808, a device with a tube adapter has been developed. Details of both devices are not clearly given.

18905 APTIC NO. 37333

Olivier, M.

METHOD FOR THE DETERMINATION OF TRACES OF MERCURY BY FLAMELESS ATOMIC ABSORPTION. *(Verfahren zur Bestimmung von Quecksilberspuren durch flammenlose Atomabsorption). Text in German. Z. Anal. Chem., 257(3):187-191, 1971. 17 refs.*

The determination of traces of mercury after reduction by stannous chloride in solution is described. The reduced elementary mercury is transported by an air stream to an absorption and cell placed in the beam of a hollow cathode lamp or a low pressure burner. The energy decrease at 254 nm is a measure of the mercury present. Methods for sample preparation of gases, water, soda liquor, urine, diethly pyrocarbonate, and other organic materials are reviewed. As little as 0.2 ppb mercury is determined by this method, which has greater sensitivity than the flame atomic absorption method. The method is suitable for inorganic and organic bound mercury and, given suitable sample preparation, is applicable to all problems. It can easily be adapted to measuring traces of mercury in waste air. Interferences by other ultraviolet-absorbing substances are largely eliminated by a compensation method (deuterium-arc background corrector).

18906 APTIC NO. 37227

Otsuka, Yukio, Y. Himi, S. Miyazaki, F. Muramatsu, T. Koyama, and S. Mori

SIMPLIFICATION OF FLUE GAS DUST MEASUREMENT AND SAMPLING METHOD FOR HEAVY METAL ANALYSIS. *(Endo haigasuchu no baijin nodo sokutei oyobi jukinzoku bunsekiyo shiryo saishu no kanika). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 232, 1971. (Presented at the Japan Chemical Society, Fall Meeting, 25th, Osaka, Japan, Oct. 11-14, 1971.)*

The Japanese Industrial Standard sampling method of flue gas necessitates probing of flue many times and the dust tube presents problems of pressure loss and glass wool packing. Furthermore, a long sampling time is required for analyses of heavy metals. The simplified method requires only one sampling in the middle of the flue, using a glass holder lined with a cylindrical filter paper made of silica wool. A performance test was given in a 16 cm duct where a gas with a known concentration of fly ash was passed through. In addition, measurements were taken in a dry furnace, a kiln, a boiler, a flue, and a dust collector hopper, and the results were compared with those taken by the JIS method and the impact method. The fly ash measurement was close to the theoretical concentration. The pressure loss was only 1/20 of the previously used dust tubes with glass packing. The silica wool filter paper method does not require a large vacuum pump for suction of the air as did the previous method. The sampler could endure flue temperature of 600 C for about three hours; however, it was necessary to preheat the filter paper in the holder in order to obtain a constant quantity. Compared with the results obtained by several probings by the JIS dust tube, one sampling by this sampler was within the 0.8-1.2 error.

18907 APTIC NO. 37609

Paulus, Harold J.

AIR POLLUTION DEFINITION, IDENTIFICATION AND EVALUATION. *Preprint, Society of Manufacturing Engineers, Dearborn, Mich., 12p., 1970. 5 refs. (Presented at the Economics of Environmental Pollution Abatement, Creative Manufacturing Seminar, Detroit, Mich., Dec. 1-2, Paper MM70-603.)*

Air pollution is a growing problem and correct identification and evaluation of pollutants is an essential step toward the solution. Air pollutants may be classified by their physical nature into particles and gases. Particulate pollution includes dust, fumes, mists, smoke, and aerosols. Of the gaseous contaminants, carbon monoxide, sulfur dioxide, sulfur compounds (hydrogen sulfide and mercaptans), nitrogen oxides, ammonia, organic hydrocarbons, ozone, and oxidants are the most prevalent. The evaluation of these pollutants depends on their relative concentrations and behavior in the atmosphere. Measurement methods include the dust fall method, high volume samplers, smoke spot samplers, and electronic counters for particulate matter, and sulfation, gas chromatography, the lead peroxide method, colorimetry, spectrophotometry, electric conductivity, and general monitoring for gaseous pollutants. Refinement in evaluation techniques is necessary to improve research on health and other effects of exposure to contaminated air.

18908 APTIC NO. 37103

Pfaffmann, Carl and Trygg Engen

PSYCHOLOGY: ABSOLUTE JUDGEMENTS OF ODOR. AN ABSTRACT. *A.M.A. Arch. Ind. Health, 17(5):544-545, May 1958.*

Research on the human capacity to judge odor intensity showed that the average observer can soon learn to identify three levels of intensity and identify at least 16 categories of odor quality. An expert can identify five levels of intensity. Increasing the number of categories presented for judgement did not influence these results appreciably, and no reliable departures from the findings were obtained with four different odorants: amyl acetate, n-heptanal, n-heptane, and phenylethyl alcohol. There was a small but significant improvement in accuracy of identification with increase in the size of the physical step between stimuli.

18909 APTIC NO. 37433

Pierce, James O. and Raymond J. Collins

CALIBRATION OF INFRARED ANALYZER FOR CONTINUOUS MEASUREMENT OF CARBON MONOXIDE. *Am. Ind. Hyg. Assoc. J., 32(7):457-462, July 1971.*

Calibration curves for the Beckman IR-15A infrared analyzer are presented for carbon monoxide analysis. These curves are for the ranges of 0 to 25 ppm, 110 ppm, and 0 to 365 ppm. The GAIN setting on the amplifier and the pressure must be set as specified on the calibration curves. The analyzer does have a filter cell charged with wet carbon dioxide to reduce the interference from water vapor and carbon dioxide. However, 2.5% water vapor by volume will cause a response equivalent to 6.4 ppm carbon monoxide. Therefore, any sample that is collected in normal air, and is to be analyzed for low concentrations of carbon monoxide, should be passed through a drying tube to remove moisture. The analyzer requires about 3 min, at a flow rate of 3.6 l/min, to reach full equilibrium with the new sample. Any sample to be analyzed for carbon monoxide should have a minimum volume of about 12 l, or almost 0.5 cu ft. (Author summary)

18910 APTIC NO. 36925

Pinigin, M. A.

AUTOMATIC 24-HOUR ASPIRATOR FOR THE COLLECTION OF ATMOSPHERIC AIR SAMPLES. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. V. A. Ryazanov (ed.), Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 111-115. (Translated by B. B. Levine.)*

NTIS: TT61-11148

Air sampling by automatic 24-hour aspirator is examined with respect to operating procedures, efficiency, and adaptability. The 24-hour aspirator can operate over considerably longer periods of time than other aspirators and can be set to operate at any desired speed for individual specimens if necessary. Records can be made of quantitative fluctuations in pollutant concentrations in the course of 24 hours with simultaneous recording of maximal single and actual average 24-hour concentrations. The Ryazanov aspirator, modified by the addition of a collector valve, is discussed. (Author conclusions modified)

18911 APTIC NO. 37405

Purdue, Larry J., Jared E. Dudley, John B. Clements, and Richard J. Thompson

REINVESTIGATION OF THE JACOBS-HOCHHEISER PROCEDURE FOR DETERMINING NITROGEN DIOXIDE IN AMBIENT AIR. *Environ. Sci. Technol., 6(2):152-154 Feb. 1972. 10 refs.*

Permeation tubes were used to generate atmospheres containing known amounts of nitrogen dioxide at ambient air levels which were sampled by the Jacobs-Hochheiser procedure or absorption of NO2 in sodium hydroxide solution. Nitrate ions are not generated on sampling these atmospheres, and no account need be made for their presence using this procedure. The sodium carbonate generated on sampling must be carefully considered in an analytical procedure involving a hydrazine reduction to determine nitrate ions by colorimetry. Overall analytical efficiency for the Jacobs-Hochheiser procedure, as carried out in this investigation, is 35%. Surface active agents cannot be used, because of excessive foaming. Fritted glass bubblers give higher precision than glass-restricted orifices. (Author abstract modified)

18912 APTIC NO. 37301

Rao, C. S. and A. E. Dukler

THE ISOKINETIC-MOMENTUM PROBE. A NEW TECHNIQUE FOR MEASUREMENT OF LOCAL VOIDS AND VELOCITIES IN FLOW OF DISPERSIONS. *Ind. Eng. Chem. Fundamentals, 10(3):520-526, Aug. 1971. 6 refs.*

A new, simple experimental technique for reliable simultaneous measurement of local phase velocities and local solids concentrations in a dispersed gas-solid flow stream is based on the use of a pitot-type sampling tube designed for isokinetic flow operation. The tube is supended by needle bearings and thus responds to the forces acting on it due to drag, pressure, and a change in momentum as the two-phase stream makes a 90 deg change in direction. This force is measured with a transducer located external to the test section. Use of this force measurement combined with flows of solid and gas phases taken under isokinetic conditions permits the unambiguous calculation of local velocities of each phase and local concentration. Criteria for operating the sample probe under isokinetic conditions are discussed and typical experimental data are presented. The technique will enable improved design and control of such processes as pneumatic conveying of solids, moving bed catalytic reaction systems, combustion of metallized propellant in rocket nozzles, nuclear reactor cooling, and gas-solid separator systems. (Author abstract modified)

18913 APTIC NO. 37315

Ross, William D. and Robert E. Sievers

ENVIRONMENTAL AIR ANALYSES FOR ULTRATRACE CONCENTRATIONS OF BERYLLIUM BY GAS CHROMATOGRAPHY. *Environ. Sci. Technol., 6(2):155-158, Feb. 1972. 10 refs.*

A routine method of analysis for ultratrace concentrations of beryllium in particulate matter collected of air filters and in water is described. The particulate matter on the filters is ashed, the residue is digested with acid, and the resulting solution is buffered to the optimum pH for solvent extraction. Potential interfering metals are eliminated by masking with ethylenediaminetetraacetic acid (EDTA). A benzene solution to trifluoracetylacetone (H(tfa)) is allowed to react with the beryllium in the aqueous solution to form Be(tfa)2. The organic extract is injected into a gas chromatograph equipped with an electron-capture detector. The chromatographic peak resulting from Be(tfa)2 formed from the unknown solution is compared with standard Be(tfa)2 solutions for quantitation. Analysis of air filters showed beryllium concentrations from 0.00016 to 0.00049 microgram of Be/cu m of air in the 14 urban samples examined. (Author abstract modified)

18914 APTIC NO. 36955

Rouse, G. E. and D. N. Stevens

THE USE OF SULFUR DIOXIDE GAS GEOCHEMISTRY IN THE DETECTION OF SULFIDE DEPOSITS. *Preprint, American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York, N. Y., 24p., 1971. 9 refs. (Presented at the American Institute of Mining, Metallurgical and Petroleum Engineers, Annual Meeting, New York, March 3, 1971, Paper 71-I-133.)*

Investigations were carried out on the origin, migration, and detection of sulfur dioxide from sulfide mineral deposits. It was verified that SO2 is generated during the oxidation of sulfides, that it migrates to surface either directly or by a series of aqueous solution and evaporation steps, and that it can be measured in both soil gas and air in background and anomalous amounts. Case history work over known minerals deposits has shown anomalous readings which, almost without exception, appear to correlate with source sulfides. At several different localities anomalies have been reproduced on different days over a span of months, and even years. Depth penetrations of several hundred feet appear to have been achieved. The method works well over deeply oxidized deposits, and deposits covered by glacial till, residual soils, and permeable bedrock. Although it is premature to compare the advantages and limitations of this exploration technique to other remote sensing methods, the approach appears to have very substantial potential for finding undiscovered ore deposits in a variety of geologic terrains. (Author conclusions)

18915 APTIC NO. 37111

Ruff, R. J.

CATALYTIC METHOD OF MEASURING HYDROCARBON CONCENTRATION IN INDUSTRIAL EXHAUST

FUMES. Am. Soc. Testing Mater. Spec. Tech. Publ., no. 164:13-22, 1954. 4 refs. (Presented at the American Society for Testing Materials, Annual Meeting, 57th, Chicago, Ill., June 15, 1954.)

Portable and fixed catalytic units were developed for measuring hydrocarbons in industrial exhaust fumes. Because measurements are based on the increase in sampled gas temperature resulting from complete oxidation of its combustible components, the shortcomings associated with familiar explosimeters are minimized. The combustibles are adsorbed on the active surface on a platinum catalyst and oxidized without flame. The oxidation liberates the same amount of heat that would result from burning an equal weight of the material by flame. The heat released by the catalytic oxidation is measured by placing thermocouples in the air stream entering and leaving the catalyst. The upper limit of detection is established by the catalyst temperature limit: about 1800 F. The lower limit of detection is determined by the sensitivity of the temperature measurements. This range when expressed in terms of heat energy applies to all combustible substances; it corresponds to different percent by volume ranges depending on the heat of combustion and the molecular weight. Performance data are given for the portable instrument in butadiene measurements and for the fixed instrument in measurements of oven exhaust gases.

18916 APTIC NO. 37072

Rushing, D. E.

A TENTATIVE METHOD FOR THE DETERMINATION OF ELEMENTAL PHOSPHORUS IN AIR. *Am. Ind. Hyg. Assoc. J., 23(5):383-387, Sept.-Oct. 1962. 6 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, [illegible], Washington, D. C., May 1962.)*

A method by which elemental phosphorus in air may be sampled and determined is described. Collected in xylene the elemental phosphorus is separated from the oxides by reaction with silver nitrate. The phosphorus is converted to phosphate and colorimetrically determined by the molybdenum blue procedure. About 1 to 2 micrograms per aliquot can be determined. (Author abstract)

18917 APTIC NO. 37327

Saltzman, B. E.

SIMPLIFIED METHODS FOR STATISTICAL INTERPRETATION OF MONITORING DATA. *J. Air Pollution Control Assoc., 22(2):90-95, Feb. 1972. 7 refs.*

Statistical techniques are useful for interpreting monitoring data for pollutants and process variables. Simplified nomographical methods are presented for relating numbers of samples to confidence intervals for their mean values, and for determining the proportion of the population exceeding a specific concentration and confidence intervals for the proportion. The methods are applicable to lognormal and normal distributions. A chart is also given for design of a quality-control program. Illustrative frequency distribution data are given for the hourly average methane concentrations in the air in Cincinnati, Ohio over three-week periods; they show trimodal lognormal distributions. The methods described provide the necessary answers to many common problems in a very simple manner.

18918 APTIC NO. 37344

Saucier, Jean-Yves and Eric B. Sansone

THE RELATIONSHIP BETWEEN TRANSMITTANCE AND REFLECTANCE MEASUREMENTS OF SOILING INDEX. *Atmos. Environ., 6(1):37-43, Jan. 1972. 11 refs.*

Experimental relationships between transmittance and reflectance measurements of suspended particulate matter were determined for aerosols of constant optical properties and for the atmospheric aerosol in Pittsburgh, Pennsylvania. The slopes of the transmittance versus reflectance curves for dispersions of coal, limestone, fly ash, and a coal-limestone mixture were significantly different for all inter-comparisons but one. Correlation coefficients ranged from 0.87 to 0.99. For atmospheric aerosol samples obtained at three sites in the Pittsburgh area, no significant differences were found when the slopes of the transmittance versus reflectance curves were compared. The correlation coefficients ranged from 0.92 to 0.99. In terms of commonly used indices of soiling potential the relationships between transmittance and reflectance could be expressed as one COH (coefficient of haze) approximately equal to 0.5 plus or minus RUDS (reflectance unit of dirt shade). (Author abstract modified)

18919 APTIC NO. 36938

Sawicki, Carole R.

FLUORIMETRIC DETERMINATION OF NITRATE. *Preprint, National Environmental Research Center, Research Triangle Park, N. C., Div. of Chemistry and Physics, 21p., 1971. 10 refs.*

A spectrofluorimetric method for the determination of nitrate is examined. The method is based on the reduction of nitrate to nitrite with hydrazine sulfate and the subsequent determination of the nitrite formed with 2,3-diaminoaphthalene. Solvent effect on fluorescence intensity, optimum reaction conditions, and method sensitivity are discussed. (Author abstract modified)

18920 APTIC NO. 37106

Sayles, Donald A.

A FUEL CELL USED AS AN ANALYZER. *Proc. Tex. A M Annu. Symp. Instrum. Process Ind., vol. 26:24-26, Jan. 1971.*

A fuel cell for stack gas analysis has for its electrolyte a ceramic material in which a portion of the oxygen atoms have ionic mobility when the material is hot. When electrodes are installed on opposite sides of a piece of this material, an applied voltage will cause the transfer of oxygen from one side of the other. Conversely, different pressures of gaseous oxygen on the two sides will cause a voltage and, with an external circuit, a flow of current. This voltage is displayed as the readout of the analyzer. The cell output shows the ratio of carbon dioxide and water to combustion products and, therefore, gives an exact indication of the percentage of complete combustion of any hydrocarbon. The analyzer is not affected by high dew point or substantial dirt loading of a gas. Its applications include metallurgical furnaces, cement kilns, lime kilns, and all types of boilers.

18921 APTIC NO. 37477

Schaad, Rainer E.

CHROMATOGRAPHY OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS. *(Chromatographie (Karzinogener) Polyzyklischer Aromatischer Kohlenwasserstoffe). Text in German. Chromatogr. Rev., 13(1):61-82, 1970. 114 refs.*

Methods of extracting carcinogenic polycyclic aromatic hydrocarbons from soot and airborne dust samples are briefly described, and procedures for separation of the components in the extract by column, paper, thin layer, and gas-liquid chromatography are reviewed.

18922 APTIC NO. 37233

Schneider, Werner

THE AUTOMATIC DETERMINATION OF THE SO3 CONTENT AND SULFURIC ACID DEW POINT OF FLUE GAS. *(Die automatische Bestimmung des SO3-Gehaltes und des Schwefelsaeuretaupunktes von Rauchgas). Text in German. Energie Tech., 21(11):505-509, Nov. 1971. 24 refs.*

For power production, low-quality fuel is mostly used; carbon dioxide nitrogen, water vapor, sulfur dioxide, and sulfur trioxide are formed. Depending on the fuel composition and the mode of operation, the flue gas may contain up to 100 ppm SO3 and SO2. Below 400 C, the SO3 is converted to sulfuric acid mist which deposits 60 to 80% sulfuric acid in the temperature zone 130-160 C, and causes corrosion. Continuous SO3 and humidity measurement is of benefit because it permits manual or automatic adjustment of the waste gas temperature and the air surplus so that corrosion is avoided. The first SO3 measurement method was when SO3 is washed out from the flue gas with i-propanol and can then be determined as sulfate. A rather extensive maintenance service is required, due to frequent troubles with the sampling process and clogging of the barium-chlorine anilate layer. The condensation method developed by the Shell laboratories is presently considered the most reliable and accurate method. Here the SO3 is retained in a combination of cooler and glass fiber filter (temperature 70-90 C) as H2S04. For the determination of the dew point, automatic measuring units are available which are accurate enough and require little maintenance, something which must yet be achieved for S03 measuring units through further development.

18923 APTIC NO. 37128

Selheimer, C. W., William Muttera, Fred Zavasnik, and Rudolph Novak

ANALYSIS OF FUMES BY SELECTIVE ADSORPTION (CHROMATOGRAPHY). *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):595-615, Aug. 1954. 5 refs.*

As part of a program to find a fume control method applicable to the entire paint and varnish industry, sampling apparatus consisting of an air cooled condenser with trap, water cooled condenser with trap, water jacketed scrubber, air trap, calcium chloride drying tube, dry ice-acetoned cooled condenser with trap, modified Orsat gas analysis equipment, dry gas test meter, vacuum gage, pump, and gas sampling tank was tested on three different processes: tall oil-glycerine, linseed oil bodying, and castor oil-tall oil dehydration. Fume sampling runs were made on each of the three processes on a full scale plant basis, while small scale laboratory runs were made on the tall oil-glycerine and linseed oil bodying processes. The plant and laboratory runs were compared on a basis of peak fume load and material condensed. A preliminary separation was performed on material condensed in the dry ice trap from a tall oil-glycerine run using selective adsorption and results indicate feasibility of this method.

18924 APTIC NO. 37151

Selheimer, C. W. and Robert Lance

ANALYSIS OF FUMES LEAVING RESIN KETTLES AND FUME ABATEMENT EQUIPMENT. *Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):711-768, Aug. 1954. 180 refs.*

Infrared spectroscopy was successfully used to identify types of compounds in the fumes emitted during the various cooking operations in the paint and varnish industry. In particular, heat bodying of linseed oil and alkyd resin manufacture was studied. The linseed oil heat bodying reaction emits fumes primarily containing aliphatic carboxylic acids, esters, and aldehydes. Pure paraffins and olefins are also present. Analyses by both infrared and mass spectroscopy of the fumes leaving a multi-wash collector prove that the odorous materials exiting to the atmosphere are present in extremely small quantities. The fumes which condense as a liquid may be separated into their respective components by employing the techniques of chromatography. A catalytic combustion unit was tested and performed at 89 and 98%. In addition, the combustion unit releases to the atmosphere only one-third to one-sixth the total weight of uncondensables released by the wash system for comparable cooking operations. (Author conclusions modified)

18925 APTIC NO. 37155

Selheimer, C. W., Robert Lance, Allen Weinberg, and Donald Brown

ANALYSIS OF FUME CONSTITUENTS BY CHROMATOGRAPHY, WITH PRELIMINARY SEPARATION BY FRACTIONAL DISTILLATION. *Off. Fed. Paint Varn. Prod. Clubs., 26(348):653-663, Aug. 1954. 14 refs.*

Previous work on fume control in the paint and varnish industry demonstrated the possibility of separating the dry ice condensate fraction of fumes from the tall oil-glycerine esterification by chromatographic methods. The method was extended to the analysis of all the condensate fractions from the same reaction. As a further step in the physical separation of the condensates, a laboratory fractionating column equivalent to 60 theoretical plates was set up and used. The silica gel-isopropanol system previously used on the dry ice condensate would not make the separation on the other fractions collected, but Attapulgus clay did separate all the condensates; in addition, results obtained checked the silica gel separation of the dry ice condensate. Initial preparation of adsorbent is critical if consistent results are desired. Fine mesh clay is necessary for good separation, since coarse particles cause channeling and poor separation. Cooling water in the column jacket speeded up separation time from several weeks to seven hours. Gas pressure also accelerated the separation. Small auxiliary columns were used to obtain preliminary information on adsorbent-effluent systems. Fractionation of water layers indicated minute amounts of organic materials in solution. Condensates from water and air-cooled condensers were quite similar to kettle raw materials, both by odor and analysis. (Author abstract modified)

18926 APTIC NO. 36980

Spurny, K., M. Polydorova, and Z. Starcuk

ANALYTIC FILTERS MADE OF ORGANO MICROFIBRES AND THEIR USE IN DETERMINING THE CONCENTRATION OF AEROSOLS AND DUST. *(Analyticke filtry z organickych mikrovlaken a jejich pouziti ke stanoveni koncentrace aerosolu a prachu). Text in Czech. Pracovni Lekar. (Prague), 14(8):369-375, 1962. 12 refs.*

Fifteen Czechoslovak analytic filters made of organic microfibers were examined for filtration properties, clogging by industrial pulverulent aerosols, and applicability for determining radioactive aerosol concentrations. The best filters were made of chlorinized, cold-pressed polyvinyl chloride. These filters had very low resistance and retained larger quantities of samples (tenths of mg). Their efficiency was more than 95% with 0.1-micron particles at 10 cm/sec gas velocity. Penetration of the polyvinyl chloride filters by radioactive particles was insignificant, and the spectrum of alpha particles was preserved. The filters were less suitable, however, for determining the numerical quantity in aerosol concentrations than more transparent diaphragm filters.

18927 APTIC NO. 37339

Sreedharan, C. R. and V. S. Tiwari

THE USE OF A BREWER BUBBLER AS A CONTINUOUS SURFACE OZONE SENSOR. *J. Sci. Instr., 4(9):706-707, Sept. 1971. 4 refs.*

A bubbler ozone sensor based on the electrochemical reaction of ozone with potassium iodide in solution was modified to permit the continuous recording of surface ozone. The modification consisted of providing a glass solution reservoir around the bubbler so that gradual mixing could take place between the solution in the bubbler and the reservoir. This arrangement prevents ozone from escaping from the solution without reacting with it and also maintains the concentration of solution in the bubbler at a constant level. Comparison of instrument performance with that of the Ehmert apparatus showed the agreement to be within plus or minus 10%.

18928 APTIC NO. 37263

Stoll, W. G.

INSTRUMENTATION UTILIZED IN THE EVALUATION OF ENVIRONMENTAL PROBLEMS. *(Instrumentierung der Erfassung von Umweltsproblemen). Text in German. Chimia, 25(12):384-393, Dec. 1971. (Presented at the Internatinalen Fuchmesse fuer Laboratoriums- und Verfahrenstechnik, Messtechnik, and Automatik in der Chemie, 5th and the Schweizerischen Treffens fuer Chemie, 3rd, Basel, Switzerland, Sept. 13, 1971.)*

Analytical and physical chemists have made significant contributions in the field of monitoring water and air pollutants, where very specialized and reliable instrumentation is required. Usually, standard analytical methods are first applied to apparatus for series measurements. Most methods can now be partly or fully automated and can be operated by unskilled personnel. The continuous large-scale monitoring of air and water quality requires an integrated computerized surveillance system depending on the measurement of one or a few selected tracer pollutants. The difficulties of sampling and of detecting one particular pollutant at low concentrations in the presence of a great number of other substances are pointed out. Internationalization of standards and efforts to control emissions is particularly important.

18929 APTIC NO. 37689

Taguchi Keisuke and Nobuko Akashi

SIZE DISTRIBUTION OF ATMOSPHERIC PARTICLES BY ANDERSEN AIR SAMPLER. *(Andasen sanpura ni yoru taikichu fuyu funjin no syudo bunpu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):83, 1971. 2 refs. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Size distribution of dust and heavy metals in the air was determined by means of an Andersen sampler. The sample was collected at a velocity of 1 cfm for 3 to 7 days from March to July, 1971, into separators with 8 steps. Size distribution of dust was determined by weighing. Metals, expecially lead, cadmium, and copper were determined by atomic absorption spectroscopy after treating the sample with acid. Size distribution of both dust and heavy metals showed a logarithmic normal distribution. Respirable dust (less than 3.3 micron) ranged from 50 to 70%, and the heavy metals occupied approximately 70 to 80% of the respirable dust.

18930 APTIC NO. 37218

Talroze, Viktor Lvovich and Vladimir Dmitrievich Grishin

DEVICE FOR ANALYZING GAS MIXTURES BY A COMBINATION OF A CHROMATOGRAPHIC COLUMN AND A MASS SPECTROMETER. *(Assignee not given.) U. S. Pat. 3,566,674. 13p., March 2, 1971. 6 refs. (Appl. Nov. 29, 1967, 3 claims).*

Analyses of complex gas mixtures are for the most part carried out by the retention time technique of gas chromatography. This technique has a number of limitations such as the necessity of instrument calibration with reference to the suspected compound and the fact that the process of interpreting the results is laborious and often unreliable. For these reasons detectors are employed at the gas chromatography outlet which are capable of both quantitative evaluation and identification of a substance emerging from a chromatographic column. The mass spectrometer and gas-density meters are the most reliable of the available dectors, but the devices are relatively insensitive and incapable of determining the molecular weight of a compound whose name has not been preliminarily ascertained. A new device provides for the rapid and sensitive qualitative and quantitative analysis of gas mixtures that can be gasified preliminarily or directly at the inlet of the device. A minimum number of calibrations is involved. The device includes a chromatographic column connected to an effusion cell for determining the molecular weight of mixture components, the effusion cell in turn being connected to a mass spectrometer with recording instruments. A valve between the column and the cell periodically closes the communication between these components during analysis. The output of the mass spectrometer during periods of valve closure is integrated to provide data for the molecular weight determinations.

18931 APTIC NO. 37691

Tamori, Ikuo, Nobuyuki Kogure, and Kazunari Imagami

CHARACTERISTICS OF CYLINDRICAL FILTER PAPER METHOD FOR STACK DUST SAMPLING. *(Endo baijin sokutei ni okeru ento roshi-ho no tokusei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):86, 1971. 2 refs. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Characteristics od cylindrical filter papers for sampling stack dust were examined and compared with a conventional dust table method. The pressure loss, was smaller and the collection rate was better than the dust tube. The quality of the filter was homogeneous. Because of a small pressure loss, suction velocity can be increased and time of sampling can be decreased. A pump of small capacity can be used. The size of the nozzle can be determined at the sampling point by considering the suction velocity and the capacity of a pump. Exchange of a filter paper can be made only at the nozzle, thus saving time. One hour is enough for sample drying time after collection. The accuracy of weighing the filter is good.

18932 APTIC NO. 37692

Tamori, Ikuo, Nobuyuki Kogure, and Kazunari Inagaki

SAMPLING OF DUST CONTENT IN CUPOLA FLUE GAS. *(Kyupora nado koon haigasuchu no baijin nodo sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):87, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A method using materials made of quartz for cylindrical filter papers was examined in order to provide a simpler method to determine dust concentration in flue gas with elevated temperatures exceeding 600 C. For flow velocity measurements, a western style Pitot tube was adopted because of resistance to elevated temperature. A holder and filter paper made of quartz glass were used. Asbestos and quartz glass fiber were used for packing between the holder and pipe. An example of measurements using this sampler and a hood covering the top of the cupola is given.

18933 APTIC NO. 37082

Tarras, Seymour and Othel L. Pirtle, Jr.

A COMMERCIAL APPLICATION OF NUCLEAR ACTIVATION ANALYSIS TO THE STUDY OF AIR POLLUTION. *Trans. Am. Nucl. Soc., 5(2):280, Nov. 1962. (Presented at the American Nuclear Society, Winter Meeting, Washington, D. C., Nov. 26-28, 1962.)*

In cooperation with the Public Works Department, Ventura County, California, the first application of the stable-tracer activation analysis technique of determination of industrial fallout on a commercial basis was undertaken in July 1962. After background samples were collected, the raw materials entering the process at an aggregate-processing plant were labeled with the stable tracers. Dusts were again collected at the same stations and for the same period of time as the background samples. Samarium, holmium, and silver were chosen as tracers for their neutron cross sections, availability, low occurrence in the materials under study, and the characteristic radiations and half life of their radioactive isotopes. The labeled particles were fed into large rotary kilns at 2000 F after being graded according to size. After the total solids weight of each sample was determined, the samples were irradiated. The weight of each tracer appearing in each sample was then determined, and the average weight of tracer per square foot was extrapolated over the area under study to arrive at the total weight of tracer fallout.

18934 APTIC NO. 36922

Taylor, John K.

SULFUR DIOXIDE PERMEATION TUBES. *Natl. Bur. Std. (U. S.) Tech. Note, no. 545:9-30, Dec. 1970.*

The feasibility of certification of permeation tubes as standard reference materials for air pollution analysis was examined and demonstrated. Sulfur dioxide permeation tubes provide a practical means of producing gases of accurately known concentration for calibration of air pollution measurements. The disadvantages of stringent requirements for accurate temperature control and measurement as well as an accurate knowledge of flow rate of ambient air are offset by the inherent reliability of the gaseous mixtures produced. (Author conclusions modified)

18935 APTIC NO. 37673

Thoenes, Hans Willi

MEASUREMENTS OF CARBON MONOXIDE IN THE EMISSION AND IMMISSION RANGE. *(Messung von Kohlenmonoxid im Emissions- und Immissionsbereich). Text in German. Staub, Reinhaltung Luft, 32(2):46-49, Feb. 1972. 18 refs.*

For measuring the carbon monoxide concentration in the amount emitted and the amount existing in the air, numerous different methods are available. The methods with direct chemical reaction include the Orsat principle, the iodine pentoxide method, Draeger indicators, and the haemoglobin method. In the Orsat method, CO is absorbed by copper chloride or a suspension of iodine pentoxide-sulfuric acid. The volume contraction is a measure for the CO concentration of the gas sample. In the reaction of CO with iodine pentoxide, iodine is liberated and is determined with iodine solution or sodium thiosulfate. With a CO concentration of 0.3 to 0.6 volume per cent, a sample volume of 100 ml is required; at a concentration of 0.1 to 0.3 volume per cent, the sample volume must be 200 ml; at 0.02 to 0.2 per cent, 500 ml; and at less than 0.02 volume per cent, 700 ml. Apart from the iodine, the developing CO2 can also be determined by gravimetry or by determining the electrical conductivity of a reaction solution prior to and after absorption. Carbon monoxide can also be determined by chromatography. Experience has been gained with the catalytic hydration of CO to CH4 by means of a nickel catalyst. The developing CH4 is measured with a flame ionization detector. In another method, the heat enthalpy in the combustion of CO is measured. Platinum spirals or a mixture of copper oxide and manganese oxide used as catalysts. Methods which are based on the measurement of heat conductance are not suitable for CO determination. In the last few years, the non-dispersive infrared absorption method has found the widest use for measuring CO.

18936 APTIC NO. 37507

Tolmie, R. W.

APPLICATIONS OF ISOTOPES FOR INDUSTRIAL MEASUREMENTS AND CONTROL. *Preprint, United Nations, New York, 13p., 1971. 19 refs. (Presented at the United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva, Switzerland, Sept. 6-16, 4th, 1971, Paper No. A/Conf. 49/A/164.)*

Radioisotopes are being used to analyze minerals, ores, mill products, and other materials by X-ray emission or neutron activation. Ring isotope sources of 100-1000 millicuries each are used for X-ray analysis, and phsyically large antimony: beryllium sources of 2000-20,000 Ci are used to generate neutrons. Portable (for X-ray analysis only), transportable, laboratory, and on-line equipment is available, based on silicon germanium detectors and programmed pulse-height analyzers. These techniques have been combined with preconcentration methods to obtain very high sensitivites, e.g., 50 ppb for some platinum metals. They can also be used for air pollution measurements, with sensitivities of about 0.1 micrograms/cu m. An X-ray emission detector with an iodine (125) source will measure elements in air particulates in one minute. The method is suitable for calcium, iron, nickel, copper, zinc, bromine, rubidium, strontium, silver, cadmium, and lead. Similar programmed analyzers with computer-compatible magnetic tape outputs are used for measuring naturally occurring potassium (40) and the daughter isotopes of uranium and thorium to locate uranium ore deposits and to assist in general geological studies. Both geological and pollution studies are aided by techniques for measuring isotope ratios. Other applications of radioistopes are as sources of power for control and signal systems and as tracers in studies of continuous casting processes, leakage from septic tanks, and groundwater movements.

18937 APTIC NO. 37138

Wagner, T. O. and J. H. Johnson

COOPERATIVE EVALUATION OF TECHNIQUES FOR MEASURING HYDROCARBONS IN DIESEL EXHAUST (A CRC REPORT). *Preprint, Society of Automotive Engineers, Inc., New York, 19p., 1971. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710218.)*

Analyzers available for measuring hydrocarbons in diesel exhaust were evaluated in exhaust sample, span-gas, steady-state, hydrocarbon-injection, and EMA-Cycle tests. Errors in measuring exhaust hydrocarbons within one instrument appeared to be less than plus or minus 5%, while agreement among different instruments was plus or minus 10 to plus or minus 15%. These errors are presently acceptable, but may be unacceptable in the long term when testing engines for compliance against emission standards. Better agreement on span gases than on exhaust samples indicated that mode of introduction of the sample into the analyzer is an important source of variance in measurements. Texts made using the EMA cyclic technique indicated that the transient response of the analyzers is acceptable for current use. Tests with injection of added hydrocarbons in the exhaust suggested but did not prove that the response of 10-20 carbon number hydrocarbons in only 80-90% of the response of three-seven carbon number hydrocarbons.

18938 APTIC NO. 37245

Walkenhorst, Wilhelm

DUST PARTICLE CHARGE MEASUREMENTS. *(Ladungsmessungen an Staubteilchen). Text in German. Staub, Reinhaltung Luft, 31(12):478-484, Dec. 1971. 17 refs.*

An experimental arrangement for determining electric charges of suspended solids is described. A ventilator aspirates a constant amount of air through a set of plates with 22 slots 1.5 mm in width. The charged particles are precipitated in the electric field between the plates. The amount of particles which passes through can be determined by means of a tyndalloscope. The evaluation of samples under an illuminated or electron microscope gives charge distribution curves for particles of uniform size. Coal dust has a slightly lower charge than dust produced by boring. The relation between charge and particle size is linear for coal dust; in the case of dust produced by boring, the relation can be expressed by a power function with exponent 1.47

18939 APTIC NO. 37065

White, C. Eldon

MONITORING FUEL GAS LEVELS WITH A NEW ODORIMETER. *Gas, 27(8):51, Aug. 1951. 2 refs. (Presented at the Pacific Coast Gas Association, Riverside, Calif., April 4-5, 1951.)*

A new odorimeter was developed to determine whether a fuel gas when diluted to a standard degree still has enough odor to warn of its presence before reaching a dangerous concentration, or alternatively to evaluate numerically the odor level of a gas by psychometric measurements in accordance with Weber s Law. The odorimeter is operated solely by a single stream of gas flowing from a main or vessel; this gas alone furnishes the power, whereas other odorimeters require not only a source of the gas whose odor intensity is to be measured, but also auxiliary equipment to furnish a simultaneous flow of air or other odorless medium for dilution of the fuel gas.

18940 APTIC NO. 37757

Yamaki, Naomi and Hyogoro Aoyama

MEASUREMENT METHOD OF AUTOMOTIVE EXHAUSTS. *(Jidosha haiki gasu seibun no sokutei hoho). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 59-89: 1971. 10 refs. (Presented at the Lecture Meeting on Environmental Pollution Analysis and Auto Analysis, 13th, Tokyo, Japan, Nov. 10-12, 1971.)*

Various methods of sampling automotive exhaust such as continuous monitoring, a sampling probe, bag sampling, total sampling, dilution sampling, constant volume sampling, and variable flow sampling are discussed with illustrations. The methods of inorganic and organic element analyses by gas chromatography, infrared spectrophotometry, and non-dispersive infrared analyzer are explained. The methods of analyzing individual components such as carbon dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides are discussed. Carbon dioxide is analyzed by the Hampel s gas burette, gas chromatography, and infrared spectrophotometry. Carbon monoxide is analyzed by nondispersive infrared analyzer and the contact combustion method. Hydrocarbons are analyzed by infrared spectrophotometry and hydrogen flame ionization. A scrubber packed with a hydrocarbon selective absorbent can be attached to a hydrogen flame ionizer for detecting hydrocarbons. Nitrogen oxides are mainly analyzed by infrared spectrophotometry and ultraviolet spectrophotometry. More recently, the chemiluminescence method has been used in the United States. The last method is explained with a diagram.

18941 APTIC NO. 37517

Yamamoto, H., Y. Hashimoto, S. Yanagizawa, and K. Oikawa

ANALYSIS OF INORGANIC PARTICULATE MATTER. NO. 1. DETERMINATION OF CHROMIUM AND MANGANESE. *(Taikichu no muki seibun ni kansuru kenkyu (daiippo). Kuromu, mangan bunseki no zenshori ni kansuru kento). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):95, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Pretreatment of samples for determining chromium and manganese in air-borne dust by means of either emission spectroscopy or atomic absorption spectroscopy was examined. Addition of oxygenated water increases the rate of extraction of these metals by strong acids. Thus, extraction by nitric or hydrochloric acids with oxygenated water and extraction after solution of samples in alkali are compared. In addition, samples are collected by a low volume sampler with membrane filters of cellulose acetate. The dust on the filters is washed into sample solution by a supersonic washer using alkaline solution, such as 0.1 N sodium hydroxide, which gives better result of washing. In conclusion, the extraction after solution of samples into alkali is better than the extraction by acid, even with addition of oxygenated water.

18942 APTIC NO. 37693

Yamashita, Eiji and Shunsaku Jikihara

RESEARCH ON MEASUREMENT OF THE PARTICULATES, REPORT II. *(Taikichu fuyu funjin sokutei ni kansuru kenkyu II). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):89, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The FKS type low-volume air sampler as a collection device for air-borne particulates was examined. The amount collected by this sampler was compared with that collected by a filter-holder type-C to find a relationship between them. When several of these samplers were used at the same time, variation in the total air flow rate was 1.7 to 2.6% and measured value of dust varied from 2.6 to 5.4%. Using this sampler, total dust and metals, such as iron, copper, manganese, and lead in the dust were determined at several points in Amagasaki-city.

18943 APTIC NO. 37342

Yamazaki, H. and T. Hasegawa

DETERMINATION OF ACROLEIN BY THE 4-HEXYL-RESORCINOL METHOD. *(4-Hekishiru rezorushinoru-ho ni yoru akurorein nodo no sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):56, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The acrolein concentration in a foundry was measured by the 4-hexyl-resorcinol method. Samples were directly absorbed into a 40% ethanol solution of 4-hexyl-resorcinol, a 3.0% ethanol solution of mercuric chloride, a saturated trichloroacetic acid solution and ethanol, and were measured by colorimetry. The measurement at room temperature was made out two to three hours after the sampling, since the maximum absorbancy was attained during this period. The acrolein concentrations at the various locations inside the foundry were 0.04 to 1.06 ppm. The maximum acrolein concentration measurable by this method was 5.0 ppm, indicating the adequacy of the method.

AIR QUALITY MEASUREMENTS

18944 APTIC NO. 36941

Mellon Inst., Pittsburgh, Pa.

CONCENTRATIONS OF VOLATILE SULPHUR COMPOUNDS IN ATMOSPHERIC AIR. *Air Hygiene Foundation of America Bull-I, Part ii, p. 81-132, Jan. 20, 1938.*

Concent½½tions of volatile sulfur compounds (sulfur dioxide, hydrogen sulfide, and organics) in the atmospheres of certain larger cities, including Pittsburgh, Philadelphia-Camden, Washington, D. C., St. Louis, and Detroit, were measured on a periodic schedule in 1936-1937. The appended tables include data collected during the period from April to October 1937 and August to October 1936; a comparison of the two seasons; concentrations according to zones; a summary for the year; special tests in additional cities; individual station concentrations; hourly concentrations; summary of continuous tests; comparison according to time cycles and zones; seasonal comparisons; and meteorological data, i.e., wind direction and velocity, temperature, weather conditions (frost and fog), precipitation, and relative humidity.

18945 APTIC NO. 37000

Mellon Inst., Pittsburgh, Pa.

CONCENTRATIONS OF VOLATILE SULPHUR COMPOUNDS IN ATMOSPHERIC AIR. *Air Hygiene Foundation of America, Inc., Bull-I, Part i, 80p., Sept. 1, 1937.*

Concentrations of volatile sulfur compounds in the atmospheres of certain larger cities, including Pittsburgh, Philadelphia Camden, Washington, D. C., St. Louis, and Detroit, were measured on a periodic schedule during the heating season in 1936-1937. Using iodine titration and electrical conductivity methods, concentrations of sulfur dioxide, hydrogen sulfide, and other volatile organic sulfur compounds were determined. Meteorological data, including wind direction and velocity, temperature, relative humidity, precipitations and weather conditions (frost and fog), were obtained for correlation. The appended tables include station numbers and locations; summary of concentrations according to zones; summary of SO2 concentrations in 13 other cities; individual station summaries; hourly concentrations; summary of continuous tests; comparison of SO2 results according to time cycles and zones; and meteorological data.

18946 APTIC NO. 37120

Coordinating Committee of Measurement of Air Pollution in South Holland (Netherlands)

COORDINATING COMMITTEE OF MEASUREMENT OF AIR POLLUTION IN SOUTH HOLLAND. THIRD ANNUAL REPORT. SEPTEMBER 1969 - SEPTEMBER 1970. *(Coordinati commissie meting luchtverontreiniging in Zuid-Holland Derde verslag. September 1969 - September 1970). Text in Dutch. 33p., 1970.*

A summary of work done during the year September 1969 to September 1970 by the Coordinating Committee of Measurement of Air Pollution in the Netherlands is presented. A volumetric sulfur dioxide meter is described including the method of construction, uses, and period of measurement. Description of the Deposit Gauge is given. Method of reporting of results of the sulfur dioxide measurement instruments installed at different measuring stations is explained. A map showing the location of the measuring network points is included. Results of measurements of sulfur dioxide during summer and winter of 1968/69 and 1969/70 are given in the form of charts and graphs and are compared. Bar charts and histograms of unsoluble material measured in the Deposit Gauge at different measuring stations is included. A list of the locations of the measuring stations is given.

18947 APTIC NO. 37289

Yamaguchi Prefecture (Japan), Research Inst. of Health

RESULT OF PCP ESTIMATION IN THE AIR AROUND A FACTORY OF AGRICULTURAL CHEMICALS IN OGORI-TOWN. *(Ogori-machi noyaku kojo shuhen chiku no taiki chu PCP chosa seiseki ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), vol. 13:77-78, 1971.*

Concentration of PCP (pentachlorophenol) in smoke ducts of a PCP manufacturing factory and in the air around it was estimated. The rate of operation of the factory during the estimation was 25% and the climatic condition was a N or NW wind of 2.2 m average wind velocity. Air in smoke ducts was collected every hour from 9 am through 4 pm by impinger and analyzed by gas chromatography. The estimation around the factory was made by a high volume air sampler at the points of windward 200 m northeast and leeward 300 m southeast and 500 m south from the factory. The average concentration of PCP in the smoke ducts was 1.06 mg/cu m and high concentrations of 3.90 mg/cu m and 2.32 mg/cu m were recorded during 10:45-11:45 am and 3:15-3:35 pm, respectively. Values of three points around the factory were below the limit of estimation (0.0025 mg/cu m). Complaints against PCP pollution in the neighboring district of the factory were due to PCP scattered through the bags which were carried from the factory.

18948 APTIC NO. 37369

Yamaguchi Prefecture (Japan), Research Inst. of Health and Yamaguchi Prefecture, Bureau of Public Nuisance (Japan)

ABOUT THE SURVEY RESULT ON ENVIRONMENTAL POLLUTION DUE TO LEAD IN SHINNANYO CITY. *(Shinnanyo-shi ni okeru kankyoosen chosa kekka ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 13:73-75, 1971.*

A factory to manufacture 4-alkyl-lead (an anti-knock agent for gasoline) was expected to begin operations in March, 1971 in Shinnanyo City. It had been closed since January 1971. Survey results of lead contained in the air, sea, and rivers around this factory before starting operations are indicated. The survey on lead contained in the air was made by collecting suspended particulate matter with high-volume air samplers at three spots each for two days in May, July, and September 1970; the survey on lead contained in the sea and rivers was made one day each on three spots by atomic absorption spectrometry. Lead in air was 027 micrograms/cu m for a three-month average; the monthly average was 0.28 micrograms/cu m in May; 0.14 micrograms/cu m in July; and 0.34 micrograms/cu m in September. On two spots leeward to a group of factories, the concentration increased when the wind blew a little towards the south; when it leaned toward the north, the concentration tended to decrease. In one spot close to a highway, the tendency to increase during the day when traffic was busy was evident. The average figure of lead in sea water in two spots was 0.021 ppm; the average figure for a river in one spot was 0.005 ppm.

18949 APTIC NO. 37370

Yamaguchi Prefecture (Japan) Research Inst. of Health and Kudamatsu Municipal Government (Japan), Public Nuisance Section

SURVEY ON SULFUR DIOXIDE IN KUDAMATSU CITY. PART 4. *(Kudamatsu-shi ni okeru aryusan gasu no chosa. (Dai 4 po)). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 13:60-62, 1971.*

From April, 1970 to March, 1971, a survey was made by the lead dioxide method at 25 spots for sulfur dioxide and at five spots for suspended particulates in Kudamatsu city; the results of estimations of sulfur dioxide at 18 spots out of those mentioned above are reported. The concentration of sulfur dioxide was 0.72 mg/day/100 sq cm in average at the 18 spots, indicating an increase of 16.1% compared to 0.61 mg/day/100 sq cm of the previous year. Industrial districts comprised 1.05 engineering; 0.62 commercial; and 0.45 mg/day/100 sq cm sub-engineering. Since the urban area is to the leeward of seaside factories which are the main emission sources of smoke, from spring to summer (April-June) when a SE-S-W wind often blows and in winter (December to March) when a WSW-W-NW wind blows often, the tendency to increase in concentration was evident. Especially in the district located south-east of the factory, the concentration was as high as a yearly average of 1.55 mg/day/100 sq cm. The highest figure for the year indicated 1.88 mg/day/100 sq cm; in districts close to the factory, this figure tended to increase year after year.

18950 APTIC NO. 37371

Yamaguchi Prefecture (Japan), Research Inst. of Health and Iwakuni Municipal Office (Japan), Planning and Investigation Section

ON THE AIR POLLUTION IN IWAKUNI URBAN AREA. *(Iwakuni-shigaichi no taikiosen ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 13:55-59, 1971.*

From January to December, 1970, estimations of the amount of sulfur dioxide (18 spots) and dust fall (11 spots) were carried out in the same spots as were in the previous year. The amount of sulfur dioxide was an average of 0.46 mg/day/100 sq cm for all the spots, showing almost the same figure; the amount of dust fall increased slightly compared with that of the previous year, showing 7.41 t/sq km/month. In areas close to a petro-chemical factory in a northern part, this tended to increase; especially in areas close to factories in a southern part, an increasing tendency of the amount of sulfur dioxide was observed. The areas which indicated the highest figures were a petroleum employees residence in a northern part in July which showed 1.10 mg/day/100 sq cm SO2; Nada Elementary School indicated 25.27 t/sq km/month dust fall in the southern part in August. The amount of heavy oil consumption indicated an increase of 18.8% for the whole city as compared to that of the previous year. In areal difference, the area of the factory group in the northern part showed an increase of 22.5%. When the urban area was leeward to the main factories, from spring to autumn with N-NE-E winds, the occurrence of pollution also increased.

18951 APTIC NO. 37398

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

INTERIM REPORT OF COMPREHENSIVE INVESTIGATIONS ON PHOTOCHEMICAL SMOG CONDITIONS DURING SUMMER. *(Kaki ni okeru kokagaku sumoggu sogo chosa no chukan sokuho ni tsuite). Text in Japanese. 35p., Aug. 1971.*

From July to Aug. 15th in 1971, steric investigations were performed by balloon and helicopter at the Tokyo Tower, a hotel in Shinjuku, and Musashino, which lie about 2, 8, and 20 km north-west-by-west of Tokyo Bay respectively, and ozone in oxidant was measured at the housetop of the Pollution Research Institute, Rissho high school, and Hachioji (Naganuma). The comparison between the results of measurements at the front of the Metropolitan Government main building and at the housetop of second building showed that places which are directly affected by a certain specific sources should be avoided for the measurement of oxidant levels, unlike the measurement of nitrogen oxides and hydrocarbons from exhaust gases. Oxidant levels have wide ranges in which oxidant situations appear simultaneously, thus it is likely that the high oxidant level exists far up into the sky. The pollution zones with high levels of oxidant and ozone were actually recognized at a height of 100-500 and 700-800 m. In and around Tokyo, it may well be said that photochemical smog appears even for a short time when the wind is not strong and the stable air layer exists at an altitude of 100-200 m.

18952 APTIC NO. 37454

Hokkaido Prefectural Government (Japan), Dept. of Hygiene

MEASUREMENT OF AIR POLLUTION IN HOKKAIDO. PART 6. *(Hokkaido no taiki osen chosa solutei kekka hokoku. Dai 6 po). Text in Japanese. 210p., March 1970.*

Air pollution was measured for one year in 1968 at main cities in Hokkaido (Muroran, Asahikawa, Kushiro, Obihiro, and Tomakomai). Nitric oxide, nitrogen dioxide, sulfur dioxide, and suspended particulates were measured since Sept. 1968. The monthly average amount of falling dust, concentrations of sulfur oxides measured by the lead dioxide and electric conductivity methods, suspended particulate substances measured by tape filter method, special harmful substances, and meteorological data at each city are shown. Air pollution trends in each city are also summarized. Obihiro City had urban-type air pollution caused mainly by smoke and dust emitted from domestic and office heating during the winter time. Centers of Asahikawa and Kushiro cities showed urban-type pollution, but districts around factories showed the industrial-type. A specially designated city according to the air pollution control law, Muroran showed the industrial-type and significant pollution was locally observed around industrial area. Tomakomai city has become worse year by year due to the introduction of industries and showed the industrial-type.

18953 APTIC NO. 37502

Hokkaido Prefectural Government (Japan), Dept. of Hygiene

REPORT ON RESULTS OF INVESTIGATION AND ESTIMATION OF AIR POLLUTION. REPORT 7. *(Hokkaido no taiki osen chosa sokutei kekka hokoku. Dai 7 ho). Text in Japanese. 25p., Feb. 1971.*

The survey results of air pollution for 1969 in main cities in Hokkaido (Muroran, Asahigawa, Kushiro, Obihiro, and Tomakomai) are indicated, and a trend of pollution in each city is summarized. The estimation results are shown by monthly averages of each estimated spot in each city for amount of falling dust and soot, concentration of sulfur oxides by the lead dioxide and conductivity methods, concentrations of floating dust and soot by the filter paper method and concentration of hydrofluoride by the alkali filter paper method; a wind distribution chart is also given. Asahigawa, Kushiro, and Obihiro constitute an urban pollution type and the source of pollution was considered to be heating systems in winter; Muroran and Tomakomai constitute an industrial pollution type and the source was a factory. The extent of the pollution was on the same level in falling dust and soot; the concentration of sulfur dioxide has increased in Asahigawa and Kushiro.

18954 APTIC NO. 37723

Kanagawa Prefecture (Japan), Working Group of Countermeasure For Photochemical Pollution

INTERIM REPORT OF SURVEY AND INVESTIGATION ON IRRITANT SUBSTANCE AT THE TIME OF OCCURRENCE OF ENVIRONMENTAL HAZARD DUE TO PHOTOCHEMISTRY. *(Koukagaku kogai hasseiji ni okeru shigeki sei bussitsu ni kansuru chosakenkyu chukan hokoku). Text in Japanese. 5p., Sept. 1971.*

Approximately 1000 air samples, collected by the low-temperature concentration method at such places as Kanagawa Junior High School, in front of Yokohama National University, and on No. 3 Keihin National Highway since June 1971 were determined by gas chromatography and mass spectrometry. The results of investigations of suspected victims of photochemical pollution were reported on the 21st of August at Prefectural Isogo Engineering High School. Acrolein, a strong irritant substance, was detected in the range of 0.001 0.05 ppm; the possibility that this is one of the strong substances which irritates eyes became dominant. The occurrence frequency was about 60% of the total number of estimations made. Automobile exhaust gas also contained acrolein to the extent of 1 50 ppm; as the running speed increased, this tended to also increase. The results of eye irritation tests with acrolein perfectly coincided with the medical findings of patients of photochemical smog. Also the ozone content of environmental air was estimated, and it s existence was confirmed.

18955 APTIC NO. 37726

Yamaguchi Prefecture (Japan), Research Inst. of Health and Bofu City Municipal Office (Japan)

AIR POLLUTION IN BOFU CITY. (PART 2). *(Bofu-shi no taiki osen ni tsuite. (Dai 2 ho)). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), vol. 13:63-66, 1971.*

Results of the estimation at ten places from April 1970 to March 1971 are given. The average concentration of sulfur dioxide/yr was 0.46 mg/day/100 cu cm, and a significantly high value was shown on the leeward near factories. The average amount of dust fall was 5.83 t/sq km/mo, and tended to go up with the increase of consumption of heavy oil and coal which are the main fuels of the city. The concentration of sulfur dioxide increased during spring and early autumn (April September) at the center of city by the effect of southeast wind and was especially high in July and August. The amount of dust fall was high in August when a typhoon struck, but no seasonal fluctuation was observed in other pollutants. Regional difference among ten sampling places was large.

18956 APTIC NO. 37026

Alkire, H. L. and Carl R. York

AIR POLLUTION IN ALLEGANY COUNTY MARYLAND. *Maryland State Dept. of Health and Mental Hygiene, Baltimore, Div. of Air Quality Control, and Allegany County Dept. of Health, Cumberland, Md., 209p., July 1970. 19 refs.*

Results are reported for measurements of dust fall, suspended particulates, soiling index, and sulfur oxides made in Allegany County, Maryland, between spring/summer 1967 and March 1969. Much of the data concerns the heavily polluted Cumberland and Westernport-Luke regions of the county. Meteorological factors and topographical characteristics conducive to high air pollution episodes in these areas were also determined. Suspended particulates were analyzed for total concentrations, variation with wind and seasons, iron, chromium, and lead content, benzene solubles, and gross beta activity. Sulfur dioxide values measured with the Davis instrument are reported as daily, weekly, annual, and seasonal averages. Measurements obtained with lead peroxide candles are reported as monthly sufonation rates. Also given are the results of measurements of the effects of pollution on steel corrosion, silver tarnishing, and fabric color changes. Major single sources of pollution in Allegany county are described together with fuel use patterns and refuse disposal practices.

18957 APTIC NO. 36946

Blosser, E. R. and R. J. Thompson

ELEMENTAL CHEMICAL COMPOSITION OF PARTICULATES IN AMBIENT AIR. *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs. and National Environmental Research Center, Durham, N. C., Research and Monitoring, 14p., Dec. 1971. 6 refs.*

In more than 100 analyses of airborne particulates collected in ambient air in six cities, 69 of 77 elements sought were detected and measured. Eleven analytical techniques, including methods for the determination of elemental composition and for compound identification, were employed selectively to obtain the most nearly accurate concentration values for each constituent. Three types of filters were used to collect the samples in order that each sample could be prepared in the manner most appropriate for the analytical method selected. Measurements were made in Cincinnati, Denver, St. Louis, Washington, Chicago, and Philadelphia. (Author abstract modified)

18958 APTIC NO. 37305

Bourelly, Th.

THE ATMOSPHERIC POLLUTION AROUND A PETROLEUM REFINERY. *(La pollution atmospherique autour d une raffinerie de petrole). Text in French. Pollut. Atmos. (Paris), 13(51):208-215, July-Sept. 1971.*

Pollution measurements were taken in the vicinity of the Vernon Oil Refinery in Paris after the plant began operation. A comparison with the mean annual pollution from the year before when the plant was not yet in operation indicated a 39% decrease due to black smoke and a 29% decrease due to strong acidity. The meteorological phenomenon of the Parisian Basin account for the decrease and, under current climatic conditions, the pollution variations in the Vernon area are not dependent on the refinery operation.

18959 APTIC NO. 37076

Campbell, J. M. and L. Kreyberg

THE DEGREE OF AIR POLLUTION IN NORWEGIAN TOWNS. *Brit. J. Cancer (London), vol. 10:481-484, 1956. 2 refs.*

Concentrations of 3,4-benzpyrene, a widely suspected carcinogen, were estimated in samples of atmospheric smoke in Oslo and a number of smaller towns in Norway, and the results compared with similar values obtained for towns in England and Wales. Benzpyrene levels are considerably higher during autumn and winter than in spring and summer. The relative amounts of benzpyrene in Oslo smoke samples is of the same order of magnitude as that in samples from representative towns in England and Wales. The absolute amount of benzpyrene present in the Oslo air is of the same order of magnitude as that of a coastal Welsh village. Observations from Bergen show conditions similar to those of Oslo, but the absolute amounts of benzpyrene are lower. The figures from Halden and Notodden show still lower figures, lower than any observed in any locality in England and Wales.

18960 APTIC NO. 37230

Feldmann, J. G.

STUDIES ON THE PHOTO-OXIDANTS CONTENT OF THE AIR IN TOWNS AND ITS EFFECT ON THE HUMAN ORGANISM. *(Untersuchungen ueber den Gehalt der Stadtluft an Photooxydantien und ihre Wirkung auf den menschlichen Organismus). Text in German. Wiss. Z. Humboldt-Univ., Berlin, Math. - Naturw. Reihe, 19(5):493-494, 1970.*

Oxidants and nitrogen dioxide were determined in 868 air samples taken at highway crosspoints in Alma-Ata under two levels of traffic intensity, one ranging between 700-1000 and the other of 2000-2500 cars/hr. Maximum concentrations of 0.46 mg/cu m which were double the olfactory threshold were found. A direct relationship between the amounts of oxidants and the total amount of ultraviolet radiation was established indicating the photochemical mechanism involved in the generation of these pollutants. Highest levels of oxidants occurred during the summer and early fall, with diurnal peak values observed between noon and 3 however, the NO2 levels from automotive exhaust showed no seasonal dependence. Air samples taken on the main traffic roads in Moscow (1500-2400 cars/hr) at a sidewalk and at 8th and 12th floor levels during the summer and fall season showed no considerable differences in ozone and NO2 content. But the carbon monoxide levels exceeded 18-fold the maximum allowable concentrations at the road level, 6.6-10.0 fold at the 8th floor, and 7-fold at the 12th floor. Air pollution from traffic exhaust in Baku appeared to be low, probably due to the wind conditions available during the sampling period. Olfactory and electroencephalogram effects were studied on different subjects exposed to mixtures of ozone, NO2, and formaldehyde but further research is required to draw conclusions in this field.

18961 APTIC NO. 37320

Hamamura, N., T. Fukuda, H. Inoue, K. Toyoshima, K. Ishida, B. Tomita, Y. Shimizu, K. Nakamura, M. Hayakawa, and M. Noma

ON THE AIR POLLUTION OF ELECTRIC FURNACE. *(Denkiro ni yoru taiki osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):245, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The chemical analysis of the particulate matter emitted from electric furnaces revealed a high concentration of iron and heavy metals such as zinc, lead, and manganese. Samples were collected using a high-volume air sampler by 24-hour sampling in the surrounding area of three steel foundries. In the highly polluted area, the total amount of particulate matter per day was as high as 1.0 micrograms/cu m, and the chemical composition was very similar to that of the dust in the electric furnace dust collector. The concentration range of pollutants in the polluted area were Fe, 162-14.8 micrograms/cu m; Zn, 212-7.6 micrograms/cu m; Pb, 34-0.96 micrograms/cu m; Mn, 23-1.07 micrograms/cu m; and copper, 1.9-0.11 micrograms/cu m. The concentration of cadmium was 0.42-0.03 micrograms/cu m.

18962 APTIC NO. 37516

Hashimoto, Y., T. Ro, and S. Yanagisawa

SELENIUM IN THE ATMOSPHERE (4). *(Taikichu no seren no bunseki (4)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):96, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Selenium concentration and the ratio of selenium to sulfur were determined in Japanese cities, including Tokyo, in order to compare with existing data for other cities, such as Boston. Fresh snow was collected, melted, filtered, and added to nitric acid to make samples. These samples were concentrated, dried, and radiated with neutrons. After about 3 weeks, selenium was separated from samples through distillation and extraction, and was determined by means of an 800 channel gamma-ray spectrometer. Sulfur was determined by the barium sulfate method. The ratio of selenium to sulfur was about two times that of the data obtained in Boston.

18963 APTIC NO. 36997

enz, Donald J.

GRIDDED MOTOR VEHICLE EMISSIONS FOR KANSAS CITY AIR QUALITY CONTROL REGION. FINAL REPORT. *PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio, Environmental Protection Agency Contract 68-02-0044, Task 4, 14p., Dec. 27, 1971. 3 refs.*

Motor vehicle emissions for the Kansas City Interstate Air Quality Control Region are distributed over nine counties. These emissions have been apportioned among 202 grids based on available vehicle-mile data and estimates of relative vehicle emissions. Gridded emissions are given for suspended particulates, sulfur oxides, carbon monoxide, hydrocarbons, and oxides of nitrogen. (Author summary modified)

18964 APTIC NO. 37019

Laamanen, A.

SETTLING PARTICLES OF HELSINKI ATMOSPHERE. A REVIEW OF 1959-1965. *(Helsingin ilman laskeutuvat ainekset. Katsaus v:lta 1959...1965). Text in Finnish. Agency for Labor Health Studies, Helsinki (Finland), no. 33, 1967. 115p. 51 refs.*

The air pollution measuring process consists of placing receptacles at study points which are usually equidistant from each other throughout the area under study. Samples are taken monthly, unless mathematical equations are used to estimate amounts of pollution. The height at which the receptacle is placed is chosen for minimal interference from ground level particles or debris from roof-tops. The samples can be collected wet or dry. There are various types of receptacles used in the collection of samples: in Norway, Sweden and Finland, the British Standard 1747 has been used for studies of city areas. This apparatus consists of a netting over a funnel from which a plastic tube leads into a bottle protected by plastic. The samples are taken to the laboratory, analyzed and the results graphed and evaluated. The Agency for Labor Health also uses samples of snow in studying settling particles. Studies of settling particles were made in Helsinki in 1959 and in 1964. The study points were chosen according to area type: densely populated, thinly populated, and industrial. Also included were the 1959 study points to aid in evaluation of changes. The effects of temperature, winds, and rainfall were studied and, rainwater was analyzed. The results showed that air in Helsinki during the study period was moderately polluted, although two of the study points were very polluted. The pollutants were divided into water-soluble and insoluble categories, and these two categories were further subdivided and analyzed. Spring was the dirtiest season, due to early melting of snow and low rainfall; however, chloride was found mostly in winter, due to salting of highways. Recommendations based on this study include improvements in waste disposal, traffic distribution, and control of pollution from construction.

18965 APTIC NO. 37264

Laamanen, Arvo, Arvo Lofgren, and Timo J. Partanen

SOME TRACE METALS IN PARTICULATES IN THE AIR OF HELSINKI AND TURKU, 1964-1969. *Work. Environ, Health, 8(2):63-69, 1971. 6 refs.*

Minimal, median, and maximal values are given for trace metals in dust fall collected at 12 sites in Helsinki between Oct. 1964 and Sept 1965 and Oct. 1967 and Sept. 1968. Median values are given for trace metals in dust fall at two sites in Turku, 1966 1969. In Helsinki, medians and maxima of all trace metals were higher in 1967-1968. The median increase was highest for copper and the maximum increase highest for nickel and chromium. With the exception of copper and tin, Turku medians also showed an annual increase. Relatively large variations were observed between collection sites. The study also verified correlations between some trace elements and general air impurity components in an industrial area of Helsinki. Dusts were measured in industrial, residential commercial, and traffic areas. Tested metals included titanium, vanadium, Cu, Sn, Ni, Cr, maganese, and lead.

18966 APTIC NO. 37216

Marquez Mayaudon, Enrique

ACTIVITIES OF THE GOVERNMENT IN RELATION TO AIR POLLUTION. *(Actividades del gobierno en relacion con la contaminacion del aire). Text in Spanish. Asoc. Mex. Tec. Ind. Celul. Pap. (Bol.), 10(3):219-235, May-June 1970.*

The quantity, identification, collection, and analysis of air polluting gases and particles are dicussed with special relation to the Valley of Mexico. Pollutants measured in 1967-1969 included sulfur dioxide, suspended particulates, settling particles, sulfates, ozone, aldehydes, sulfuric acid, and nitrogen oxides. The results are shown in tables and graphs.

18967 APTIC NO. 37607

Mathe, Peter

MUCH INDUSTRY AND LITTLE AIR. *(Viel Industrie und wenig Luft). Text in German. Technische Umweltmag., no. 1:16-19, Feb. 1972.*

Because of heavy industrialization, the Duisburg area already has a high background concentration of pollutants. Unfortunately a new industrial center is planned in the recreational area in the Northeast of Duisburg. In a residential area in the city the following pollutant concentrations were measured during the growing seasons of 1968 and 1969: fluorides had a diurnal average of more than 2 micrograms and a daily maximum concentration of more than 12 micrograms/cu m air, the chloride concentrations were 67 and 695 micrograms/cu m air, the sulfur dioxide concentrations were 130 and 244 micrograms/cu m. During 5.3 to 15.5% of the measuring time a concentration of 400 micrograms SO2/cu m was exceeded, during 2 to 4% of the measuring time of a concentration of 750 micrograms SO2/cu m air was exceeded. Standard deciduous trees showed clear to heavy injuries. The mortality rate was high. The green belt used as a recreational area by city residents shall now be destroyed by two large power plants, one aluminum plant, and one petrochemical plant.

18968 APTIC NO. 37235

Matsumoto, Koku and Yuzuru Kitamura

ENVIRONMENTAL HYGIENIC INVESTIGATION OF AIR IN VARIOUS PLACES IN OSAKA PREFECTURE. 2. DETERMINATION OF CONCENTRATIONS OF CARBON DIOXIDE AND DUST IN THE UNDERGROUND MARKET-STREETS OF OSAKA CITY. *(Osaka-fu ka kaku chiku no kankyo chosa ni tsuite dai 2 ho. Omotoshite chika gai ni okeru nisanka tanso to jinai nodo no sokutei). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 17(5):357-361, 1971. PART I. Ibid., vol. 10, p. 191, 1964.*

Air pollution by carbon dioxide and dust in underground market-streets in Osaka city was measured. Sampling points were designated as Underground Market-Streets A (A-1 to A-5), Underground Market-Streets B (B-1 to B-2), inside the train and on the platform of the subway, facilities for amusement such as movie theaters, tearooms, bowling alleys, department stores, Nara suburbs, and Osaka Harbor. At point A-1, measurements of C02 and dust were carried out three times a day (7:45 8:30, 12:15 12:45, 17:30 - 18:30). Both C02 and dust peaked during rush hours in the morning when C02 showed 0.08 0.18% (mean value 0.10%), and dust showed 0.34 0.76 mg/cu m (mean value 0.58 mg/cu m). On Sundays and holidays, both peaks appeared during the evening: the mean value of C02 was 0.09 0.10%; dust, 0.32 - 0.54 mg/cu m. At the A-2 to A-5 and B-1 to B-4 points, the same measurements were carried out during 10:00 12:00 and 16:00 - 18:00 every day from December 1970 through January 1971. The C02 in the underground market-streets did not differ significantly from that of the outside air; C02 in tearooms, movie theaters, etc. showed higher concentrations than outside air. Concentrations of dust in the underground showed about twice that of outside air, and the maximum value (3.81 mg/cu m) was ten times that of outside air. The measuring value was high especially on the day with a smog alert. On platforms, C02 was as great as in the underground market-streets. Dust concentration was 0.99 1.47 ppm, which was higher than that of the underground market-streets. In subway trains, fluctuations of both C02 and dust were wide (C02, 0.04 -0.13; dust, 0.43 2.43). In department stores, air pollution tended to be severe in the underground floor.

18969 APTIC NO. 37766

Meszaros, E.

THE SIZE DISTRIBUTION OF WATER SOLUBLE PARTICLES IN THE ATMOSPHERE. *Idojaras (Budapest), 75(5/6):308-314, Sept./Dec. 1971. 25 refs. (Presented at the Hungarian Meteorological Society Seminar on Atmospheric Chemistry, July 23, 1971.)*

The size distribution of water-soluble particles in the atmosphere was investigated using a cascade impactor backed up by membrane filters, polystyrene filters, and glass fiber filters. Samplers were subsequently analyzed for sulfate by the turbidity of the barium sulfate suspension, for chloride by nephelometry, and for ammonium, nitrates, and calcium by colorimetric methods. In the summer, about half of the sulfate and ammonium ions, which constituted a majority of the water soluble particles, were in the Aitken size range. With decreasing particle size, the relative quantity of water-soluble substances increased. The mass median radius of calcium particles was very small. Nitrate and especially chloride particles were larger than other soluble nuclei. In the winter, the calcium and sulfate particles were larger than in the summer. Conversely, ammonium ions were associated with smaller particles in the winter than in the summer. The formation of sulfate particles and the variation of visibility caused by the growth of water-soluble particles as a function of relative humidity are discussed. Cloud physics are also considered.

18970 APTIC NO. 37288

Nishi, Teizo

STUDIES ON AIR POLLUTION IN KUMAMOTO CITY. *(Chiho chutoshi ni okeru taiki osen no eiseigakuteki kenkyu). Text in Japanese. Kumamoto Igakkai Zasshi (J. Kumamoto Med. Soc.), 45(9):895-931, Sept. 1971. 42 refs.*

Air pollution in Kumamoto City was studied for seven years beginning with 1963. In order to determine the level of air pollution by means of white cloth hung outside houses, a preliminary test was performed; air contamination by sulfate ion was noticed. Average values of dust fall measured by the Conical Funnel method at seven sampling points was 7.79 t/sq km/month, indicating that the degree of pollution in Kumamoto City is about the same as that in Hiroshima and Kyoto. The amount of soluble substances was great compared with insoluble substances and significantly high in June and July. The components of dust fall, silicon dioxide, zinc, copper, lead, manganese, and titanium were analyzed. Zinc, copper, and Si02 which showed a relatively high ratio may be derived from Aso volcanic ash. Average value of sulfur dioxide was 0.017 ppm/year. The amount of suspended particulate matter in busy intersections was 175 576 micrograms/ cu m; the concentration of lead at the same points was 0.020 0.325 micrograms/cu m. The concentration of carbon monoxide was 11 18 ppm and showed two peaks after sunrise and sunset, as did suspended particulate matter and sulfur dioxide. During one year, traffic volume increased 10%; the concentration of carbon monoxide increased 30%. The pH value of rainfall has been gradually decreasing and it showed 5.8 in 1970. This phenomenon indicates that the level of air pollution in Kumamoto becomes more serious by the complicated reaction of various pollutants.

18971 APTIC NO. 37334

Odaira, Toshio

A SURVEY OF PHOTOCHEMICAL SMOG IN TOKYO. *(Tokyo ni okeru kokagaku smoggu no gaiyo). Text in Japanese. Preprint, Japan Society of Mechanical Engineering, Tokyo, 13p., 1971. (Presented at the Seminar on Environmental Pollution by Internal Combustion Engine and its Countermeasure, Tokyo, Japan, Nov. 29-30, 1971.)*

From 1967 to 1970 (between April to October) the per-hour average oxidant concentration rose more than 0.15 ppm in 60 days which is the Tokyo photochemical smog warning standard. Sixty-four percent of the total appearance occurred in June, July, or August. The maximum concentration of 0.34 ppm occurred on July 26, 1970, and five cases of 0.22 ppm occurred in July and August 1967, August 1968, and June and July 1969. Forty-five days were sunny, 14 days were cloudy, and one occurrence was during the night. The average visibility between 5 and 7 am and the oxidant concentration between 11 am and 1 pm seemed to have some correlation. When visibility was less than 4 km between 5 and 7 am, the oxidant concentration during the day tended to rise more than 0.15 ppm/hr. There seemed to be no relationship between temperature and high concentration of oxidant. There was no clear-cut relationship between wind direction and oxidant concentration; however, the latter tended to rise when the wind was easterly. Higher concentration seemed to appear more frequently when the wind velocity was 1 3.7 m/sec, rather than less than 0.9 m/sec. According to the vertical temperature distribution, 68% of high oxidant cases occurred when mobile high pressure covered the entire Honshu, or when the pressure was high in south and low in the north, or when the front existed south of Honshu. Without exception, the sea breeze had blown on the days of more than 0.15 ppm oxidant; in most cases, the breeze increased between 10 and 12 am. The time lag between the breeze detection in Chiyoda ward and the detection of oxidant in Shinjuku ward averaged 1.1 hr. The relationship between oxidant and other pollutants seemed to be different in the case of Tokyo from that of Los Angeles. Instead of the nitric oxide concentration peak occurring during the early hours of the day as in Los Angeles, both peaks often occurred either at the same time or the NO peak occurred one to two hours after the oxidant concentration peak. Between April 1967 and Dec. 1970, there were 57 cases of oxidant detected above 0.10 ppm and 17 cases of more than 0.15 ppm concentration during the night. These cases occurred all during winter months (December to March). In most cases, the oxidant concentration began to rise about 6 pm and reached the peak between 8 and 12 pm. During these hours, NO and carbon monoxide showed the sam pattern of concentration fluctuation as oxidant.

18972 APTIC NO. 37522

Odaira, Toshio

TOKYO SMOG. *(Tokyo sumoggu). Text in Japanese. Jurisuto (Jurist), no. 492:106-118, Nov. 10, 1971. 9 refs.*

The concentration of oxidants from 1967 to 1970 was measured by the Tokyo Air Pollution Monitoring Station located in Shinjuku Ward. It was generally considered that photochemical smog would not occur in Tokyo until July 18th, 1970. On that day, however, 6000 citizens suddenly complained of smarting eyes, and sore throats. From July 23 through July 27 and again on August 5, a wide region was visited by photochemical smog, and the victims who reported irritation in eyes or throats to health centers reached over 10,000. From April 1967 until Dec. 1970, high concentrations of oxidants rose above warning standards of 0.15 ppm or more (the hourly average) on 59 days (5 days in April, 7 days in May, 14 days in June, 10 days in July, 14 days in August, 6 days in September, and 3 days in October). The highest concentration, 0.34 ppm, was measured on July 26th, 1970 and 0.22 ppm was measured on July 15 and August 11, 1967, on August 5, 1968, and on June 2 and July 18, 1969. The only countermeasure for photochemical air pollution is to reduce pollutants from automobiles, factories, and workshops.

18973 APTIC NO. 37518

Oikawa, K., Y. Okubo, and J. Kimura

ANALYSIS OF INORGANIC PARTICULATE MATTER NO. 2. METAL CONCENTRATION OF EACH SIZE. *(Taikichu muki seibun ni kansuru kenkyu. Dainiho. Ryudobetsu kinzoku sosei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):94, 1971. (Presented at the National Council Meeting of Air pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Collection of air-borne dust by size group and metal content in each size group were carried out as preparation for an investigation of the effect of fine particles on the human body. Samples were collected at 4 points in Tokyo at a velocity of 1 cu ft/min for 3 to 4 days by means of a 6-stage Andersen Sampler with an additional and final stage made of an 0.8 micron membrane filter. Collected samples underwent a series of acid treatments to produce sample solution, which was analyzed by means of atomic absorption spectroscopy for cadmium, lead, zinc, manganese, iron, chromium, and nickel. There were two relative maximums for air-borne dust at the diameter of 3 to 6 micron and at smaller than 0.8 micron. More smaller particles exist for lead, and larger particles for iron; manganese has a fairly constant distribution.

18974 APTIC NO. 37555

Rose, Steven and Les Pearce

SULPHUR DIOXIDE--A UK SNAPSHOT VIEW. *New Scientist, 53(783):376-378, Feb. 17, 1972.*

Sulfur dioxide levels in various parts of Great Britain were colorimetrically determined by students making simultaneous readings in their home environment. Of the 1500 viable responses from observers, each represented up to five readings -- one on Oct. 1, 1971 and four on Sunday, Oct. 3. The average SO2 level for all student readings was 106 plus or minus 2 micrograms/cu m. In nonsmokeless zones, the results were significantly above this average in areas of high-density housing, medium-density housing with some industry, and industrial areas. In smokeless zones, the SO2 level was reduced in some cases; in other cases, notably the high density housing plus parks category, the smokeless ratios were significantly higher than the nonsmokeless. The Friday 9 am value averaged 6% higher than the Sunday 9 am value. The geographical distribution of SO2 (low values in rural regions and south coast resorts, high values in the center of urban areas and the north of England) was in fair agreement with a government survey.

18975 APTIC NO. 37749

Varkonyi, Tibor

THE MEASURING OF REGIONAL POLLUTION OF SULPHUR DIOXIDE AND BACKGROUND CONCENTRATION IN HUNGARY. *(A regionalis kendioxid-szennyezodes es hatterkoncentracio merese Magyarorszagon). Text in Hungarian. Energia Atomtech. (Budapest), 24(10):411-419, 1971. 19 refs.*

Because of the concentration of air pollution sources and the limited possibilities for local dilution, the local character of pollution has changed to a regional character. Due to the higher rate of sedimentation of course particles, gases and molecular substances are chiefly responsible for regional pollution. Country-wide sulfur dioxide concentration measurements revealed summer and winter averages of 20 and 40 micrograms/cu m, respectively. Twenty-two test series were carried out in various industrial areas in Hungary to determine regional background concentrations for SO2. The yearly maximum and minimum averages obtained are 73 and 251 micrograms/cu m, respectively. Where industry is the chief source of SO2 emission, the differences between summer and winter averages are smaller, with winter values being consequently higher. In some industrial areas, SO2 concentrations lie steadily above the hygienic norms. The probability of regional pollution is higher in winter since summer pollutions have more local character. Benign effects of mountains and forests are evident. The dynamics of regional pollutions are more complicated than those of local ones, and are more harmful than smogs, since all members of a population, and even many successive generations are exposed. The effects of regional pollution are also manifest in agriculture, causing decreasing crops. The regional measurements were carried out by means of Woesthoff type SO2 detection instruments. The investigations of the effect of SO2 in Budapest city revealed action radii (at wind velocities of 0.6-2.0 m/sec) of 10 km in summer and 20-25 km in winter, with great differences in the lee and weather side. The action radius is distorted to ellipse due to the action of winds.

18976 APTIC NO. 37306

Violet, P., G. Dumarchey, and F. Jourdan

AIR POLLUTION AND METEOROLOGY. *(Pollution de l air et meteorologie). Text in French. Pollut. Atmos. (Paris), 13(51):201-207, July-Sept. 1971.*

Carbon monoxide, carbon dioxide, sulfur dioxide, and dust measurements were taken in Lyon, France, on three days of exceptional pollution in Nov. 1970. Simultaneous meteorological observations revealed an important temperature inversion whose effects on the concentration and dispersion of pollutants are discussed. Although pollution level measurements may succeed in giving the first warning of a pollution episode, meteorological observations are necessary to describe the evolution of the episode and to give a forecast of its occurring at a certain time.

18977 APTIC NO. 37366

Wada, Akio, Hiroo Mizutani, Masaru Kitase, Morihiko Hayakawa, and Eiichi Ito

MAIN STREET AIR POLLUTION FROM VEHICLE EXHAUST IN NAGOYA. *(Nagoyashi kotsu yochi ni okeru jidosha haiki gasu osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):231, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Carbon monoxide, nitrogen oxides, and lead compounds from auto exhaust were analyzed in relation to the traffic volume and wind speed. Samples collected at two intersections in Nagoya City by 48 hour continuous samplings were analyzed by infrared spectroscopy (CO), Saltzman s method (NOx), and atomic absorption method (Pb). The average CO concentration was 4.6 ppm at Fushimi and 6.1 ppm at Ichiba, and the correlation values of CO to traffic volume were 0.70 and 0.73, respectively. The CO concentration was greatly dependent on the wind speed. The average Pb concentration was 1.55 gamma/cum at Fushimi and 1.73 gamma/cu m at Ichiba, and their correlation values with traffic volume were 0.57 and 0.27, respectively. The correlation value of CO and Pb concentration was 0.87. The Pb concentration at 100 m above ground was three quarters of that of the ground level. The concentrations of particulate matter was 0.272 mg/cu m at Fushimi and 0.283 mg/cu m at Ichiba.

18978 APTIC NO. 37394

Wada, Akio

AIR POLLUTION BY AUTOMOBILE EXHAUST GASES AT MAIN PLACES IN NAGOYA CITY. *(Nagoya-shi kotsu yochi ni okeru jidosha haiki gasu osen). Text in Japanese. Nagoya-shi Eisei Kenkyusho (Ann. Rept. Nagoya City Health Res. Inst.), no. 17:83-87, 1970. 6 refs.*

Sampling was carried out six times at two points on national highway with heavy traffic and at other 18 points. Each measurement was done every hour started from nine o oclock in the morning and lasted for 48 hr. Carbon monoxide, nitrogen oxides, suspended particulate substances, lead, wind direction, wind velocity, and traffic volume were measured. As a result, significant pollution was not seen in Nagoya City except in certain districts and at certain times. But when traffic was more than 8000 cars/hr, it was observed that carbon monoxide and lead were over the standard concentration although for a short period. In this case, the amount of suspended particulate substances was also locally high.

18979 APTIC NO. 37473

Waldbott, G. L.

AIRBORNE FLUORIDE IN THE LAKE ST. CLAIR-DETROIT RIVER AREAS. *Fluoride, 4(2):93-96, April 1971. 6 refs.*

A study of air pollution in the Lake St. Clair-Detroit River area was undertaken by a special board at the request of the International Joint Commission representing the governments of Canada and the United States. Of the 80 sampling stations set up, five monitored airborne fluorides -- two in the Port Huron/Sarnia area and three in the Detroit/Windsor area. The maximum recorded F(-) values ranged from 1.3 ppb in Port Huron/Sarnia samplings to 2.9 ppb at Grosse Isle, Michigan. In comparison, the highest level obtained by the National Air Sampling Network in 1966 and 1967 was 2.4 ppb. Gladioli planted at five locations had F(-) levels of 25-50 ppm. Tip and margin burns occurred within five weeks after the gladioli were planted. Before these findings can be applied to the evaluation of the health effects of F(-) on humans, consideration should be given to such variables as duration and continuity of sampling, height of sampling stations and their distance from emitting sources, and F(-) levels in soil and edibles. (Author abstract modified)

18980 APTIC NO. 37458

Yanagisawa, Saburo

SURVEY OF ACTUAL CONDITION OF AIR POLLUTION AROUND TOKYO AND OSAKA INTERNATIONAL AIRPORTS. *(Tokyo oyobi Osaka Kokusai Kuko shuhen ni okeru taiki osen jittai chosa hokokusho). Text in Japanese. Association for Pollution Control Caused by Airplane (Japan), 86p., June 1971. 20 refs.*

Surveys concerning the actual condition of air pollution around Tokyo and Osaka International airports were carried out Dec. 1970 and April 1971. In Osaka, carbon monoxide, total hydrocarbons, nitrogen oxides (nitric oxide and nitrogen dioxide), and 11 kinds of hydrocarbons were measured by the first survey, and CO, total hydrocarbons, and NOx were measured by the second survey. Exhaust gases from jet engines were measured by the first survey and CO and NOx by the second survey in Tokyo. Sample air collected by a Mylar bag was passed through silica gel, and the CO was determined by infrared spectrometry. Hydrocarbons in the sample air collected by the same method were analyzed by gas chromatograph with flame ionization detector. Carbon monoxide was under the standard value in all the cases, and the effect of airplanes on CO increase was not observed. Hydrocarbon measured as methane was 3.0 ppm in mean value, 7.3 ppm in maximum, and 2.3 ppm in minimum at the first survey in Osaka, and 2.3 ppm in mean, 7.5 ppm in maximum, and 1.5 ppm minimum at the second survey. Mean, maximum, and minimum values of NOx in the first and second surveys in Osaka were 0.032, 0.075, and 0.010, and 0.066, 0.121, and 0.019 ppm respectively. Also at the second survey in Tokyo, they were 0.091, 0.262, and 0.011 ppm. Elements of solid components in smoke were not much different from those of urban air.

ATMOSPHERIC INTERACTION

18981 APTIC NO. 37400

AERIAL PHOTOGRAPHY: OCEANIC POLLUTION. *(Luftaufnahmen: Verschmutzung des Meeres). Text in German. Umschau (Frankfurt), 72(3):74, Feb. 1972.*

Certain substances may concentrate heavily in the ocean from the continuous supply from natural water bodies and from atmospheric pollution, which gets into the water as a consequence of the exchange processes. Recent estimates have shown that at least 50% of the world s production of DDT gets into the ocean each year. In the coastal waters of Japan, 100 ppm polychlorinated byphenyls were measured. Many toxic metal compounds reach the oceans directly or are transported onto the oceans surface through the atmosphere. The substance transport between the atmosphere and the ocean can be promoted by the presence of oil slicks. Surface active substances such as oil slicks change the reflection by different optical properties and by attenuation of the capillary waves at the water surface. Thus oil slicks can be detected by aerial photography.

18982 APTIC NO. 37431

THE CONCORDE AS A NUISANCE SOURCE. *Ingenieur, 83(49):L58-L60, Dec. 10, 1971. 6 refs. (Includes a discussion in German.)*

Objections to the Concorde as a nuisance source are considered. Even if all the coal and hydrocarbons contained on the earth were burned at the same time, the percentage of oxygen in the atmosphere would drop only from 20.95% to 20.32%, which is 1/4 of the drop in oxygen experienced by a traveller when climbing from sea level to the peak of a small mountain. Since wash occurs much more rarely in the stratosphere than at medium altitudes, the argument cannot be defended that the Concorde would cause persistent condensation, thereby forming a screen that could affect the equilibrium of the thermal radiation. Owing to the very low degree of humidity at these altitudes, the rare wash that might be formed would not last long. A single storm of moderate violence causes more steam to rise in the atmosphere than 500 Concordes flying all day long. The stratosphere has remained relatively dry in spite of the fact that at least 2000 storms break out simultaneously throughout the world, so that it is not very likely that water vapor from aircraft engines could be transformed into layers of clouds. If 500 Concordes were to fly at the same time, they would increase the amount of carbon gas by only 0.5 millionths, and no hydrocarbons whatsoever will be produced when at high altitudes. The Concorde will fly well below the ozone layer. Noise problems still exist, as well as the problem of sonic boom.

18983 APTIC NO. 37748

Japan Meteorological Assoc. (Japan)

REPORT OF THE SURVEY OF ATMOSPHERIC DIFFUSION IN KAINAN DISTRICT OF WAKAYAMA PREFECTURE. *(Wakayama Kainan-chiku taikikakusan chosa hokokusho). Text in Japanese. 156p., March 1969. 4 refs.*

The distribution of pollution, the area of atmospheric diffusion, and the effective height of a chimney were measured using an air tracer in the period of August 4-11, 1968. The high smoke sources were the loop line smoke sources with a semidiameter of 200 m using a special shelter attached fine particulate generator suspended from the helicopter, and the low smoke sources was set up at a point 10 m above the earth. Golden and green particulates were scattered simultaneously for 30 minutes. About 100 measurement sites were established as far as eight km on the lee. Using a balloon, the perpendicular distribution of an air tracer was measured at eight equal intervals up to 280 m from the earth. Time-course changes of the density on the earth were measured by a drum impacter. For the effective height of the chimney, measurements were performed by triangulation at three sites on the earth using the smoke of a smoke candle from a chimney of 120 m. The meteorological conditions on the experimental days were unfavorable except for the eighth and ninth. The results showed that since Kainan City was a town located in the ravine, diffusion was rapid and the areas of high density were located close to the smoke source. The stability of Pasquill for the smoke sources of 200 m was B C and that for the smoke source of 10 m was A. The increase in the smoke axis height by the leeward distance was large and for this reason, the decrease of density was rapid after the maximum was attained. Among the evaluation formulas for the effective height of a chimney by Bosanquet, Carn, Halton, and Priestley, the formula obtained by modifying Priestley's formula reduced the error from the actual measurement value.

18984 APTIC NO. 37606

Arakawa, Hidetoshi

MUNICIPAL WEATHER AND MUNICIPAL HAZARDS. *(Toshi kiko to toshi saigai). Text in Japanese. Jurisuto (Jurist), no. 492:132-138, Nov. 10, 1971. 2 refs.*

The atmospheric temperature of Tokyo has been gradually rising. Data, measured by the Metrological Agency, from 1923 to 1963, in Chiyoda Ward, Tokyo, shows that the temperature at night since 1946 does not fall as much as in prewar time (until 1942) because of air pollution. The heat island phenomenon, which means the rising of temperature in the central parts of cities, and several factors of municipal weather and hazards such as humidity wind, rain, snow, land subsidence, high tides, in municipal areas, offensive odors and noise are discussed. Air pollution in municipal surroundings has been increasing each year. Emissions of air pollutants from motor vehicles and factories chiefly contribute to air pollution. Purification of these pollutants occurs by wind, rain, and snow. Therefore, exclusion of air pollution from cities may be achieved by urban redevelopment encouraging the construction of high buildings in order to prevent overcrowding and to maintain adequate open spaces and adequate air.

18985 APTIC NO. 37651

Barrett, Earl W.

DEPLETION OF SHORT-WAVE IRRADIANCE AT THE GROUND BY PARTICLES SUSPENDED IN THE ATMOSPHERE. *Solar Energy, 13(3):323-337, Nov. 1971. 10 refs. (Presented at the Solar Energy Society Conference, 1970.)*

Changes in the concentration of those atmospheric constituents which contribute to the planetary albedo can give rise to climatic alterations. Suspended particles in the atmosphere contribute to the albedo by virtue of their light scattering power. A mathematical model is presented of the effect of particulate loading on loading on daily totals of irradiance at the ground at various latitudes and seasons. Rayleigh scattering by the gaseous constituents of the atmosphere, and Mie scattering by a uniform layer of polydisperse particles having a power law size distribution function, are assumed. These computations show that substantial depletions of irradiance can result from moderate to heavy particulate loadings, and that an increase in man-made particulate emissions by a factor of 50 or more could give rise to a general cooling of serious magnitude. (Author abstract modified)

18986 APTIC NO. 37247

Bartusek, K. and D. J. Gambling

SIMULTANEOUS MEASUREMENTS OF STRATOSPHERIC AEROSOLS USING LIDAR AND THE TWILIGHT TECHNIQUE. *J. Atmospheric Terrest. Phys., 33(9):1415-1430, Sept. 1971. 20 refs.*

Results are presented of simultaneous observations of stratospheric aerosols using the twilight scattering and lidar techniques. The observations were carried out at time of sunset in Adelaide during 1969. In general, the agreement between lidar and twilight gradient results was not good. The significant increase in aerosol concentration measured with the laser radar on one occasion was not reproduced in the twilight gradient. Furthermore, the marked seasonal trend evident in the lidar results in not shown in the twilight gradients. Calculations obtained with a theoretical twilight model suggested that aerosols in the troposphere and in the stratosphere above the stratospheric aerosol layer, undetected by the present lidar technique, could significantly affect the peak value of the twilight gradient.

18987 APTIC NO. 37671

Bary, E. de

MEASUREMENTS OF SOLAR AND SKY RADIATION AND THEIR INTERPRETATION BY NEW THEORETICAL METHODS. *(Messungen von Sonnen- und Himmelsstrahlung und ihre Interpretation durch neuartige theoretische Verfahren). Text in German. Beitr. Physik Atmosphaere, 45(1):84-86, March 1972. 6 refs.*

The extinction of solar radiation by aerosols was determined and used to calculate the radiation density; the result was compared with the results of measurements of the radiation density from the sky. The extinction of solar radiation was determined with a simpl photometer with two spectral ranges; a more sensitive photometer with four spectral ranges was later used to determine the radiation density of the sky. Measurements were taken on June 4, 1971 on the Hohenpeissberg. This site was selected because it was above the ground level haze layer and because the aerosols present there were representative for all of central Europe. The scattering functions of the aerosols derived from the extinction measurements were calculated according to tables by de Bary et al. A good correlation between the calculated and measured radiation density was found. The size distribution of the aerosol particles followed a potential law: exponent nu was 3.4; the limit radii r1 was 0.04 and r2 was 10 micron with a turbidity T55 of 3.9.

18988 APTIC NO. 37388

Bigg, E. K.

SOME POSSIBLE EFFECTS OF AIRCRAFT FLYING IN THE STRATOSPHERE. *Clean Air, 5(4):57-59, Nov. 1971. 5 refs.*

Particles collected at height up to 40 km over Australia were analyzed so that the effects of pollution of the stratosphere by aircraft could be predicted. The enormous variability in particle types, sizes, and concentrations observed from one flight to the next showed that monitoring of the stratosphere would not be an absolute safesguard against the effects of pollution. Large systematic changes could go undetected because of this natural variability. Dominant particles in the 0-10 km region in inland Australia are ammonium sulfates. In contrast to 1962, when ammonium sulfate predominated, sulfuric acid in 1971 is found almost exclusively between 10-15 km. Whether the difference between 1962 and 1971 is due to the volcanic eruption on Bali in 1963 or to increased industrial activity is not known. Absorption by the sulfuric acid particles of the water vapor in aircraft exhaust gases could cause changes in stratospheric heating rates and in the light-scattering and radiation balance. Photochemical changes could be of even greater significance.

18989 APTIC NO. 36985

Blaskova, D., G. Kurchatova, Tz. Tchapanov, V. Andreev, and Kazasov

REGIME OF THE TEMPERATURE INVERSIONS IN SOFIA DISTRICT AND THEIR INFLUENCE ON THE POLLUTION OF THE ATMOSPHERIC AIR BY SULFUR DIOXIDE. *(Rezhim na temperaturnite inversiiv sofiysko i vliyaniyeto im v rkhu zam rsyavaneto na atmosferniya v zdukh s s seren dvuokis). Text in Bulgarian. Izv. Inst. Khidrol. Meteorol. Bulg. Akad. Nauk. (Sofia), vol. 13:103-146, 1968. 11 refs.*

Temperature inversion regions in Sofia, Bulgaria, were examined by upper air soundings, hourly thermograph data collected at a height of 2.40 m, and synoptic surface maps. The height and duration of the inversions are discussed in relation to various meteorologic parameters and seasonal data. Atmospheric pollution by sulfur dioxide is discussed in terms of the inversions, as well as the incidence of pharyngitis, tonsillitis, and bronchitis.

18990 APTIC NO. 37258

Brock, J. R.

MODELS FOR ASYMPTOTIC SIZE DISTRIBUTIONS FOR ATMOSPHERIC AEROSOLS. *J. Colloid Interface Sci., 37(4):907-911, Dec. 1971. 10 refs.*

Two models for the asymptotic size distribution of atmospheric aerosols are examined. One of the models assumes condensation to be the dominant growth process for atmospheric aerosol particles greater than approximately 0.1 micron. The model yields various characteristic distributions which resemble Rosin-Rammler distributions. In the second model, the theory of stable distributions is used to show that a power law or Paretian asymptotic size distribution is preserved during subsequent alterations, such as condensation and coagulation, provided the elements undergoing these processes are themselves independently and identically distributed in the domain of attraction of certain positive stable laws. (Author abstract)

18991 APTIC NO. 37565

Campbell, Malcolm J.

TRANSFER BY AEROSOLS OF EFFECTS OF HIGH ENERGY SOLAR RADIATION TO THE BIOSPHERE. *Nature (London), 236(5340):26-28, March 1972. 23 refs.*

Because the stratospheric aerosols cluster near the lower edge of the ozone layer, little ultraviolet radiation penetrates in the wavelengths 220 to 300 nm. Below 200 nm oxygen absorption is almost complete, but the band 200 to 220 nm opens a partial window. If we consider a uniform film of dry trypsin, 0.01 mg/sq cm and roughly 0.1 micron thick, as a model for the effects of ultraviolet radiation on aerosols, the incident flux in the 210 nm window will inactivate 1.5 times 10 to the 8th power molecules/sq/cm/sec. This gives a lifetime against complete inactivation of 170,000 sec of irradiation. The dose rate is equivalent to 21 rad/sec of gamma radiation. Irradiated aerosols are called aerons. The radioactivity produced in nuclear weapons tests usually attaches indiscriminately to natural aerosols as it percolates downward through the stratosphere, ultimately re-entering the troposphere and appearing as fallout. The mechanisms which cause fallout aerosols to exchange from the stratosphere to the troposphere will similarly transport aerons into the lower atmosphere. Coagulation of aerons with the larger and more plentiful surface air aerosols will cause the aerons to grow towards the size optimum for deposition in the deep alveolar regions of the lungs. Health effects of aerons and the quality of stratospheric air are mentioned.

18992 APTIC NO. 37058

Chotorlishvili, L. S.

DISTRIBUTION OF PASSIVE IMPURITY IN TURBULENT MEDIUM FROM A LINEAR SOURCE. *(Rasprostraneniye passivnoy primesi v turbulentnoy srede ot lineynogo ictochika). Text in Russian. Soobshch. Akad. Nauk Gruz. SSR, 59(2):321-324, 1970. 4 refs.*

The solution of a number of geophysical and technical problems (for example, cloud and fog modification) requires a knowledge of the diffusion of a reagent from different sources in a turbulent medium. It is then possible to determine the place and quantity of the substance introduced. The diffusion of a passive, impure admixture from an infinite line source in clouds and fogs is mathematically analyzed. A constant eddy diffusion coefficient and capture of the admixture particles by the medium particles are assumed.

18993 APTIC NO. 37099

Chotorlishvili, L. S.

SPREAD OF PASSIVE CONTAMINATION IN TURBULENT MEDIUM FROM POINT SOURCE. *(Rasprostraneniye passivnoy primesi v turbulentnoy crede ot tochechnogo istochika). Text in Russian. Soobshch. Akad. Nauk Gruz. SSR, 60(1):973-975, 1970. 3 refs.*

A knowledge of the diffusion rate of an admixture during cloud and fog modification makes it possible to determine the amount of admixture to be introduced and the point of introduction. The dispersion of a passive contaminant from a point source is analyzed on the assumption that the size of the particles in the turbulent medium is larger than that of the contaminating particles. Constant turbulence of the medium and complete capture of the contaminating particles by the medium are assumed.

18994 APTIC NO. 37483

Dimitriades, Basil

EFFECTS OF HYDROCARBON AND NITROGEN OXIDES ON PHOTOCHEMICAL SMOG FORMATION. *Environ. Sci. Technol., 6(3):253-260, March 1972. 19 refs.*

Samples of automobile exhaust with varying hydrocarbon and oxides of nitrogen levels were irradiated in a smog chamber under conditions that resulted in levels of smog manifestations similar to those observed in the atmosphere. Hydrocarbon levels ranged from 0.3 to 5.0 ppm carbon, and oxides of nitrogen levels ranged from 0.08 to 1.4 ppm. Photooxidation of nitric oxide and formations of oxidant, peroxyacetyl nitrate, formaldehyde, and nitrogen dioxide were used as smog manifestations. Except for the NO2 yield, all smog manifestations were intensified by increasing HC; NOx inhibited the oxidant, PAN, and formaldehyde yields but promoted the rate of NO oxidation and the NO2 yield. To achieve an air quality equivalent to the current California standards for oxidant and NO2, NOx should be less than 0.33 ppm and HC less than 2.5 times the oxides of nitrogen. (Author abstract modified)

18995 APTIC NO. 36940

Dodge, M. C. and J. J. Bufalini

THE ROLE OF CARBON MONOXIDE IN POLLUTED ATMOSPHERES. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., 24p., 1971. 14 refs.*

The role of carbon monoxide in polluted atmospheres was investigated with respect to the effect of CO on the rate of photooxidation of nitric oxide. The effect of CO on NO oxidation in the absence and presence of hydrocarbons, nitrogen dioxide formation in the presence and absence of CO and water vapor, and reaction mechanisms were studied. The hydrocarbons ranged from the more unreactive paraffins and aromatics to the very reactive unsaturated hydrocarbons and included mesitylene, 1-butene, ethylene, toluene, benzene, and pentane. Hydrocarbon-nitrogen oxide systems approximating ambient polluted conditions were also examined. The addition of CO enhanced No oxidation both in the presence and absence of reactive hydrocarbons; CO concentrations required to achieve conversion, however, were usually higher than those present in polluted atmospheres. Experiments were conducted in an irradiation chamber.

18996 APTIC NO. 37071

Duce, Robert A., John W. Winchester, and Theodore W. Van Nahl

IODINE, BROMINE, AND CHLORINE IN THE HAWAIIAN MARINE ATMOSPHERE. *J. Geophys. Res., 70(8):1775-1799, April 15, 1965. 36 refs.*

Approximately 200 samples of rainwater, aerosol, and gas were collected from the atmosphere in the zone of the northeast trade winds on the island of Hawaii west of Hilo and over the ocean east of Hilo during the summer of 1963. These samples were analyzed by neutron activation. The iodine/chlorine and bromine/chlorine ratios in the rain samples increased with increasing altitude, and the iodine/chlorine ratio was 500-1000 times higher than in sea water while the Br/Cl ratio was only slightly higher than the seawater value. The I/Cl ratio in aerosol particles increased with increasing altitude and distance from the sea. On the shore the I/Cl ratio was 10-40 times greater than the seawater value, while a half mile inland the I/Cl ratio was over 200 times greater than the seawater ratio. The Br/Cl ratio was greater than the seawater value for aerosol samples collected on land but was less than the seawater ratio for samples collected from aircraft over the ocean. There was a tendency for the I/Cl ratio to decrease with decreasing particle size for the aerosol samples. Approximately half of the chlorine and bromine present in the Hawaii atmosphere was in a gaseous form, whereas a larger percentage of the iodine apparently existed as a gas. Some of the possible mechanisms which might cause the well-known atmospheric iodine enrichment, such as photochemical oxidation of iodide at the sea surface and the presence of an iodine-rich organic film on the sea surface, are correlated with the results of the investigation. A tentative explanation involving photochemical oxidation and possible bromine contamination from automobile exhaust is offered for the unexpected difference in the Br/Cl ratios over sea and land. (Author abstract modified)

18997 APTIC NO. 37033

Fay, James A. and John B. Heywood

THE DISPERSION OF POLLUTANTS FROM AIRCRAFT. *Society of Automotive Engineers, Inc., New York and Dept. of Transportation, Washington, D. C., Aircraft Environ. Conf., 1971. p. 28-39. 16 refs. (Feb. 8-10, Paper 710322.)*

Two aspects of the dispersion of pollutants from aircraft are reviewed. The first is the dispersal of aircraft exhaust emissions in the vicinity of airports; the second is the dispersal of exhaust trails in the upper atmosphere. Techniques available for modeling this dispersal and how they might be applied to the airport problem are discussed. Field studies of airport pollution are then reviewed to assess current pollutant levels around airports and the aircraft s contribution to those levels. The possibility of contrail formation from jet emissions at high altitude is then considered and the effect of uncertainties in the trail mixing processes evaluated. (Author abstract)

18998 APTIC NO. 37349

Finlayson, B. J., J. N. Pitts, Jr., and H. Akimoto

PRODUCTION OF VIBRATIONALLY EXCITED OH IN CHEMILUMINESCENT OZONE--OLEFIN REACTIONS. *Chem. Phys. Letters, 12(3):495-498, Jan. 1, 1972. 10 refs.*

The vibration-rotation bands (Meinel bands) of the ground electronic state of the hydroxy radical were observed in the chemiluminescent gas phase reactions of ozone with ethylene, propylene, 1-butene, cis-2-butene, and tetramethylethylene at total pressures of about 3 torr at room temperature. The emitting species were tentatively identified as electronically excited aldehydes, ketones, and alpha-dicarbonyl compounds. The production of vibrationaally excited OH radicals in ozone-olefin reactions at reduced pressures may be of considerable importance to the chemistry of the upper and lower atmospheres. This may be of significance for calculations of, for example, the perturbation of the ozonosphere by supersonic transport. (Author abstract modified)

18999 APTIC NO. 37698

Gebhart, Reiner

ON THE EQUATORIAL OZONE PROFILE. *Ann. Geophys., 27(2):243-254, 1971. 30 refs.*

The vertical distribution of ozone over the equator was simulated under various model assumptions and compared with recent observations. Oxygen-hydrogen reactions as well as diffusive and advective transport were incorporated in a time-dependent meridional model. Best agreement with observations was obtained using 70% of Vincent s mean stratospheric circulation along with a modified version of Prabhakara s pattern of large scale eddy diffusion. The water vapor mixing ratio was assumed to be 2.10 to the minus fifth power g/g throughout the stratosphere. Hampson s parameter describing the wet photochemical reactions was chosen as 2.10 to the minus ninth power cm to the three-halves power per sec to the minus one-half power per mole. The theoretically calculated total amount of ozone was equal to the observed amount. The height of maxiumum ozone, however, was predicted approximately 3-4 km too high and the computed ozone densities of the upper stratosphere exceeded the observed ones with maximum deviationns of up to 100% in the region around 35 km. (Author abstract modified)

19000 APTIC NO. 37542

Georgii, Hans Walter

CONTRIBUTION TO THE ATMOSPHERIC SULFUR BUDGET. *J. Geophys. Res., 75(12):2365-2371, April 20, 1970. 10 refs.*

Measurements of sulfur dioxide and sulfate-containing aerosols in the free atmosphere were conducted to extend earlier investigations of the sulfur budget and of the stratospheric sulfate layer. Examination of the chemistry in the free atmosphere by aircraft ascents was considered a first step in an attempt to explain the sources and the persistence of the stratospheric sulfur layer. It seemed of particular interest to investigate the possibility of aerosol formation within the troposphere, which might constitute a constant source of sulfate aerosols that would grow by coagulation during extended residence in the stratosphere. An increase of the sulfate/sulfur dioxide ratio with altitude was observed. A hypothesis on the mechanism of sulfate formation in the troposphere in the presence of clouds is offered, along with new data on the background concentration of sulfur dioxide and sulfate aerosols in pure air. The sulfur dioxide concentration over the Atlantic Ocean was between 0 and 3 micrograms SO2/cu m, and the sulfate concentration was around 2-5 micrograms/cu m. (Author abstract modified)

19001 APTIC NO. 37313

Goetz, Alexander and Olgierd J. Klejnot

FORMATION AND DEGRADATION OF AEROCOLLOIDS BY ULTRAVIOLET RADIATION. *Environ. Sci. Technol., 6(2):143-151, Feb. 1972. 7 refs.*

Formation of aerocolloids from traces of hydrocarbons in air occurs in a steady airflow exposed for 6-60 sec to the light of quartz ultraviolet lamps, which generates ozone oxidant. The same oxidant forms aerocolloid in darkness with such reactive hydrocarbons as turpentine and cyclohexene. Enhancing factors are ultraviolet light, humidity, nucleating matter, and ammonia. The yields are reduced on adding ammonia in the dark and on shifting the humidity by mixing of airstreams. Degradation of airborne aerocolloids by ozone with short-wavelength ultraviolet light is observed, after a peak of formation, at lower humidities of less than or equal to 50% rh. The ultraviolet degradability of impactor deposits depends on formation conditions and the nature of the hydrocarbons. (Author abstract)

19002 APTIC NO. 37357

Halpern, Paul, Conrad Simon, and Larry Randall

SOURCE EMISSIONS AND THE VERTICALLY INTEGRATED MASS FLUX OF SULFUR DIOXIDE ACROSS THE NEW YORK CITY AREA. *J. Appl. Meteorol., 10(4):715-724, Aug. 1971. 10 refs.*

Sulfur dioxide concentrations in ambient air, obtained from helicopter soundings and traverses, together with wind data from pibals, were used in a kinetic box model to determine hourly average three-dimensional fluxes of SO2 for the New York City area. Continuous dry-bulb temperature and pressure height records were obtained concurrently and utilized in the analysis and interpretation of the flux data. The SO2 fluxes were compared to degree-day-dependent emissions from residential, industrial, and utility sources. The vertical structure of the fluxes is related to diurnal variations of the temperature lapse rates. Furthermore, the emission rates determined from the measurement of flux in 13 tests agree with those derived from the New York City SO2 emission inventory within limits which have been considered acceptable for use in air pollution modeling. (Author abstract modified)

19003 APTIC NO. 37543

Healy, T. V., H. A. C. McKay, A Pilbeam, and D. Scargill

AMMONIA AND AMMONIUM SULFATE IN THE TROPOSPHERE OVER THE UNITED KINGDON. *J. Geophys. Res., 75(12):2317-2321, April 20, 1970. 20 refs.*

Ammonia occurs in the troposphere chiefly as ammonia gas or as ammonium sulfate. The principal source of the ammonia, at least in the United Kingdom, appears to be the urea in animal urine. The ammonia thus released is converted on a time scale of hours into ammonium sulfate, the conversion process being quite rapid in the dark, as well as in the light, and over a range of relative humidity values. The most significant mechanisms probably are the reaction with sulfur dioxide and oxygen in mist or cloud droplets and reactions with sulfuric acid droplets from power station plumes. There is no positive evidence for appreciable reaction on solid particulates, but the possibility cannot at present be excluded. Photochemical reactions probably make only a small contribution. A direct gas-phase reaction between ammonia and sulfur dioxide does not seem possible at the concentrations and temperatures concerned. It is important to elucidate the mechanisms so that ammonium sulfate levels in the troposphere and their effects, e.g., on visibility, can be predicted. (Author abstract)

19004 APTIC NO. 37037

Hendrickson, E. R.

DISPERSION AND EFFECTS OF AIR BORNE FLUORIDES IN CENTRAL FLORIDA. *J. Air Pollution Control Assoc., 11(5):220-225, 232. May 1961. 14 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 53rd, Cincinnati, Ohio, May 22-26, 1960.)*

Citrus groves, winter truck crops, and commercial gladioli in a 100-sq-mile area of central Florida all show evidence of damage by airborne gaseous fluorides. Sources of the fluorides are phosphate rock drying and grinding plants, superphosphate and elemental phosphorus plants, and a defluorinating plant. The dispersion of the gaseous fluorides is tracked by a network of static sampling stations using filter papers treated with calcium formate solution (sulfur dioxide is also measured, by the lead peroxide candle method). During the sampling period, records are also obtained of wind direction and velocity and vertical temperatures in the area. When analysis is complete, concentrations are plotted on maps for each month at each sampling station. From this information isopleths are drawn in the light of wind roses for that particular month. With this technique, it is possible to determine the extent of pollution from several sources, to compare one area with another, and to evaluate monthly changes in exposure at single stations.

19005 APTIC NO. 37024

Israel, H.

ATMOSPHERIC ELECTRICITY. VOLUME I: FUNDAMENTALS, CONDUCTIVITY, IONS. *(Atmosphaerische Elektrizitaet). Probl. Kosm. Phys. (Germany), vol. 29, 1957. 841 refs. Translated from German by D. Ben Yaakov and Baruch Benny. Israel Program for Scientific Translations, Jerusalem, 317p., 1970.*

NTIS: TT-67-51394-1

The physics of gaseous ions and submicroscopic suspensions are reviewed from the standpoint of laboratory and field experience. Normal and other ionization processes and the mobility, adsorption, diffusion, and recombination of ions are discussed. Processes occurring in an ionized gas under the influence of an externally applied electric field are indicated. Current-voltage characteristics and the electrode effect are considered. The motion of ions is noted and the phenomenon of nonselfsustaining discharge at reduced pressure is discussed. Luminescent phenomena are described. Charge carriers, types of discharge, and ignition are discussed for self-sustaining discharge. The conductivity of the atmosphere and its origin, and electrostatic measuring devices and measuring techniques for conductivity, ions, suspensions, and radioactivity are considered.

19006 APTIC NO. 36953

Ivlev, L. S., N. K. Spazhakina, N. O. Grigorov, and Ye. L. Yanchenko

EFFECT OF HUMIDITY CHANGES ON THE OPTICAL MICROPHYSICAL CHARACTERISTICS OF ATMOSPHERIC AEROSOL. *(Vliyaniye izmeneniya vlazhnosti na opticheskiye i mikrofizicheskiye kharakteristiki atmosfernogo aerosolya). Text in Russian. Probl. Fiz. Atm., no. 8:112-123, 1970. 11 refs.*

The effects of particle condensation, coagulation, and sedimentation on the optical properties of the atmosphere are discussed, and theoretical estimates of particle size distributions are compared with experimental data. The size spectrum of dry particles with 0.1-5 micron radius does not show any clearly expressed dependence on atmospheric relative humidity. This means that the processes of condensation, coagulation, and sedimentation, at relative humidities below 100%, can be studied separately and that the optical properties of atmospheric aerosols can be determined by optical or electron microscope analysis of filter or impactor samples. Junge aerosol in the surface layer with particles having a refractive index of m equals 1.5 changes its optical properties with the appearance of a monolayer of water on the particles, m equals 1.33. The resultant decrease in the coefficient of aerosol attenuation may be related to the fact that visibility improves at 75-80% relative humidity. A smaller decrease in the coefficient of aerosol attentuation was observed with an increase in wavelength for a moist aerosol and an increase in the forward elongation of the scattering indicatrix at small angles.

19007 APTIC NO. 36984

Ivlev, L. S. and V. I. Dmokhovskiy

STABILITY IN THE SIZE DISTRIBUTION OF AEROSOL PARTICLES IN THE SURFACE LAYER OF THE ATMOSPHERE. *(K voprosu o stabil nosti raspredeleniya aerozol nykh chastits po razmeram v prizem-*

nom sloye atmosfery). Text in Russian. Probl. Fiz. Atm., no. 8:123r129, 1970. 1 ref.

Filters were used to collect atmospheric aerosols during a stable anticyclonic condition with a clearly expressed diurnal variation of turbulent exchange. The measurements were made at different altitudes and at points about 2 km apart. The filters were cleared with xylol or were processed with acid and then photographed under optical and electron microscopes. Mean particle size distribution functions were determined over the range 0.01-10 micron in radius. Fractions with a radius greater than 2.0 micron were the most unstable in the mean diurnal spectra. The size distribution functions had the greatest dispersion in the morning hours and the minimum dispersion at midday. The fine disperse fraction had a minimum at midday and a maximum in the morning; the percentage of the coarse disperse fraction increased after midday. Under specified conditions, the ground layer of the atmosphere is characterized by quite stable particle size distributions close to a Junge distribution.

19008 APTIC NO. 37013

Ivos, J., Hania Ciszek, A. Rezek, and Lj. Marjanovic

FLUORINE WASTE GASES IN THE SURROUNDING ATMOSPHERE OF YUGOSLAV FACTORIES. *(Otpadni plinovi fluora u okolisnoj atmosferi nasih tvornica). Text in Serbo-Croatian. Vet. Arh., 40(3/4):61-77, 1970. 20 refs.*

The transport of fluorines in Yugoslav areas threatened with outbreaks of fluorosis and the concentrations of fluorine in the electrolysis rooms and the atmospheres of aluminum factories were investigated with respect to direction, range, and speed of dispersion and relation to the hydrometeorologic characteristics of the area. In the electrolysis rooms, monitored in three factories, average annual fluoride concentrations were 4.6, 5.6, and 3.6 mg/cu m. The concentration in the surrounding atmosphere, determined by analysis of the precipitation, was 0.4 mg/l annually. Fluorides moved in the direction of the prevailing winds to a defined distance and then decreased again. The annual average concentrations for all six measurement locations ranged from 1.04 to 0.14 mg/l.

19009 APTIC NO. 37639

Ivos, J., Hania Ciszek, A. Rezek, and Lj. Marjanovic

FLUORINE WASTE GASES IN THE SURROUNDING ATMOSPHERE OF YUGOSLAV FACTORIES. *(Otpadni plinovi fluora u okolisnoj atmosferi nasih tvornica). Text in Serbo-Croatian. Vet. Arh., 40(3-4):61-77, 1970. 20 refs.*

The dispersion of fluorides was investigated in three areas of Yugoslavia jeopardized by fluorosis: Kidricevo, Lozovac, and Razine. Fluorides were measured in both aluminum electrolysis rooms and the open atmosphere to determine the direction and extent of their dispersion. The annual average levels in the electrolysis rooms were 4.6 mg/cu m at Kidricevo; 5.6 mg/cu m at Lozovac; and 3.6 mg/cu m at Razine. In the Ptuj field (Kidricevo), the average annual amount of fluoride in precipitation was 0.4 mg/l at six locations representing various directions and distances from the source of contamination. The annual average amount of fluorides for all six locations was 1.04-0.14 mg/l. The fluoride-containing waste gases moved in the direction of prevailing winds to a definite distance, after which the concentrations decreased.

19010 APTIC NO. 37270

Jubb, A.

THE GAS TURBINE AND ITS INFLUENCE ON POLLUTION OF THE ENVIRONMENT. *Preprint, 9p., 1971. 4 refs. (Presented at the International Congress on Combustion Engines, 9th, Stockholm, Sweden, 1971.)*

The process of exhaust gas dispersion from power plant stacks is reviewed based on diffusion models and experiments with gas turbines as the power source. Sulfur dioxide concentration from a tall stack were measured and correlated with meteorological data on stability, winds, inversions, plume behavior, and ground level concentrations. Efficiency values were constructed for the conventional coal-fired plant, the established distillate-fired gas turbine, the future high-temperature distillate-fired gas turbine, and a combination system. The use of known power techniques to reduce pollution is discussed.

19011 APTIC NO. 37583

Kao, S. -K. and James B. Gebhard

AN ANALYSIS OF HEAT-, MOMENTUM-TRANSPORTS, AND SPECTRA FOR CLEAR AIR TURBULENCE IN MID-STRATOSPHERE. *Pure Appl. Geophys. (Basel), vol. 88:180-185, May 1971. 12 refs.*

An analysis of the clear air turbulence in the mid-stratosphere indicates that the turbulence is characterized by an anisotropic field of turbulence with an intense lateral component of the turbulence, associated with strong thermally stable stratification. The Richardson number in the region of turbulence is generally smaller than 1/4, Taylor s criterion for a stratified shear flow. Cospectra for momentum transport by the streamwise, lateral, and vertical components of the velocity show similarity in their distribution, decreasing with increasing wavenumber. The cospectra for heat components of the velocity show similarity in the high and medium wavenumber ranges, but not in the low wavenumber range of the spectra. The power spectra of the temperature and wind speed are very similar, and are approximately proportional to the minus 5/3 power of the wavenumber. Power spectra of the streamwise and lateral components of the velocity are approximately proportional to the minus 2 power of the wavenumber, whereas the spectrum of the vertical component of the velocity is approximately proportional to the minus 1 power of the wavenumber. (Author summary)

19012 APTIC NO. 37703

Kattawar, George W. and Gilbert N. Plass

INFLUENCE OF AEROSOLS, CLOUDS, AND MOLECULAR ABSORPTION ON ATMOSPHERIC EMISSION. *J. Geophys. Res., 76(15):3437-3444, May 20, 1971. 8 refs.*

The emerging radiation arising from thermally emitted photons is calculated for a realistic model of the earth s atmosphere. The sources of radiation considered are: planetary surface with various values for the albedo; aerosols distributed with height according to the Elterman model and with scattering function calculated for the haze C model; water molecules distributed with height according to the mean annual conditions at middle latitudes and at wavelengths with weak, moderate, and strong absorption; clouds of two thicknesses composed of spherical water droplets with a modal radius of 12 micron. Multiple scattering of the photons is followed by a Monte Carlo technique. The aerosol contribution is the least important at wavelengths in the region of 6 micron. The radiance attributable to thermally emitted photons in the infrared is mainly determined by the distribution with height of the water molecules, at those wavelengths where the optional thickness due to the water molecules is greater than unity. At those wavelengths where the absorption by the water molecules is small, the albedo of the planetary surface has an important influence on the upward radiance and the emission by the aerosols has a secondary role. At wavelengths where the absorption by the water molecules is still smaller, the radiance is determined by both the albedo of the planetary surface and the aerosol distribution with height. Clouds may completely alter the radiance values. (Author abstract modified)

19013 APTIC NO. 37645

Kellogg, W. W., R. D. Cadle, E. R. Allen, A. L. Lazrus, and E. A. Martell

THE SULFUR CYCLE. *Science, 175(4022):587-596, Feb. 11, 1972. 59 refs.*

An attempt is made to put the man-made contribution of sulfur compounds to the atmosphere (and oceans) into persepective by comparing it with the contribution of the natural sources. Sources, sinks, and lifetimes of sulfur compounds in the atmosphere-ocean system are considered. Rainout and washout, removal of sulfur dioxide by diffusion to soil and vegetation, and the dry removal of sulfate particles are discussed. River transport of sulfur compounds and a model of the sulfur cycle are described. Man is now contributing about one half as much as nature to the total atmospheric burden of sulfur compounds, but by A.D. 2000 he will be contributing about as much, and in the Northern Hemisphere alone he will be more than matching nature. In industrialized regions man is overwhelming natural processes, and the removal processes are slow enough so that the increased concentration is marked for hundreds to thousands of kilometers downwind. The main areas of uncertainty and the ones that demand immediate attention because of their importance to the regional air pollution question are indicated. (Author conclusions modified)

19014 APTIC NO. 37697

Kuroda, Hiroshi, Yasuo Nakajima, Isao Murase, and Takeji Oguri

INFLUENCE OF ATMOSPHERIC HUMIDITY EFFECTING ON NITROGEN OXIDES EMISSION FROM AUTOMOTIVE GASOLINE ENGINES. *Jidosha Gijutsu (Automobile Eng.), 24(4):18-26, 1970.*

Chassis dynamometer tests were conducted to determine the relationship between atmospheric humidity and exhaust nitrogen oxides concentrations and to establish a correction coefficient for humidity. Nitrogen oxides emissions at 30-50 mph and humidity of 31-135 grains/lb (grains equal 1/7000 lb) were measured during the cold start, seven-mode seven-cycle test. The pronounced variation in emissions with changes in humidity confirmed previous conclusions that nitrogen oxides data obtained under other than constant experimental conditions must be corrected for humidity. The correction factor included in the California test procedure for mass nitrogen oxides measurements is applicable under conditions of the present study. The variation in nitrogen oxides concentrations due to humidity is almost completely explained by air-fuel variations and water-injection effects. Accurate correction factors should be available once the relationship between these factors and nitrogen oxides concentrations at various operating conditions is clarified.

19015 APTIC NO. 36949

Little, C. G., V. E. Derr, R. H. Kleen, R. S. Lawrence, R. M. Lhermitte, J. C. Owens, and G. D. Thayer

REMOTE SENSING OF WIND PROFILES IN THE BOUNDARY LAYER. *Environmental Science Services Administration, Boulder, Colo., Wave Propagation Lab., ESSA-TR-ERL 168-WPL 12, 123p., June 1970. 63 refs.*

The potential capabilities of remote sensing techniques for the measurement of wind profiles in the boundary layer of the atmosphere (i.e., up to about 1.5 km) were evaluated. The techniques were the Doppler radar technique as it might be utilized with acoustic, radio, and optical fields; acoustic, radio, and optical forward-scatter or line-of-sight propagation techniques; and the crossed-beam eddy correlation technique (using either passive or acting sensing of the eddies). The techniques were theoretically analyzed in terms of height range, height resolution, height accuracy, velocity range, velocity accuracy, directional range, directional accuracy, and time resolution. The results show that the Doppler acoustic echo-sounding concept offers genuine promise of providing, at reasonable cost, a system capable of meeting the desired specifications for wind profile measurements. The other technique with the potential for meeting system specifications is the active crossed-beam correlation technique. Both methods warrant experimental evaluation.

19016 APTIC NO. 36954

Lujanas, V. and S. Salavejus

DETERMINATION OF VERTICAL DISPLACEMENT OF AIR MASSES USING THE RADIOACTIVE ISOTOPES. *(Opredeleniye vertikal nykh pevemeshcheniy vozdyshnykh mass pri pomoshchi radioaktivnykh izotopov). Text in Russian. Academy of Sciences, Lithuanian SSR, Inst. of Physics and Mathematics, Investigations of Atmospheric Self-Scavenging Processes from Radioactive Isotopes, Proc. Conf., Palanga, Lithuania, 1966, p. 37-41. 2 refs. (July 7-9.)*

Vertical air displacement was determined using the radioactive tracers sodium(22) and beryllium(7). On several occasions in May 1965, the ratio of sodium(22)/beryllium(7) reached values characteristic of stratospheric air. A special coincidence-spectrometer was used to determine sodium(22) concentrations, while beryllium(7) was measured at the 478 kev gamma-line.

19017 APTIC NO. 37705

Minami, Hiroshi

AUTOMATIC SELF-RECORDING ANEMOMETER FOR AIR POLLUTION. *(Taiki osen chosayo jiki fuko fusokukei ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(2):105-112, Feb. 1972.*

The importance of weather observation as a controlling factor of air pollution and the methods of recording traceable wind by a self-recording anemometer are discussed in general. Structural principles of specific anemometers, methods of installation, methods of reading, and their applications are discussed. Other weather factors that play important roles in air pollution such as vertical temperature distribution, the horizontal temperature and humidity distribution, and the rain quantity are mentioned briefly. A traceable wind anemometer has six vanes which rotate by the wind and convey the rotation to the magnetic field alternate current battery and create voltage. The boss magnet rotates and the magnetic bundle produces electricity. The CI amplifier amplifies the power and averages it out by the CR circuit. The anemometer indicates the wind direction on the weather vanes which is then converted by a control synchronizer and creates direct voltage. The direction is recorded by a pen on the paper which is wrapped around the rotating axis and moves with the axis. In order to avoid the error which occurs near north when the wind direction changes, 540 deg are covered by two meters, covering a complete 360 deg and additional 180 deg.

19018 APTIC NO. 37014

Mount, W. D., B. R. Fow, C. V. Wick, and C. M. Maloy

THREE RADIOMETRIC DATA ANALYSIS TECHNIQUES FOR MEASURING AIR TEMPERATURE PROFILES. (FINAL REPORT). *Sperry Rand Research Center, Sudbury, Mass., Air Pollution Control Office Contract CPA 22-69-116, Rept. SRRC-CR-70-27, 101p., Oct. 23, 1970. 3 refs.*

NTIS: PB 199412

The problem of determining the height of the base, the intensity, and thickness of an elevated inversion layer from radiometric Thermasonde data is discussed. Three advanced radiometric data analysis techniques emphasizing the detection and measurement of these salient features of elevated inversions are proposed. The techniques include: a statistical procedure for finding the best three-straight-line representation of the true profile from the radiometric data, called the gradient altitude model; a relaxation procedure for finding the ambient temperature at sixteen preselected heights from the surface to 2.54 km; and several analog and empirical techniques for detecting the presence and determining the base heights and other features of an elevated inversion directly from the recorder outputs of Thermasonde data. The initial development and evaluation of these techniques using simulated and real data are presented. The problem of determining the features of an elevated inversion becomes more difficult as the height of its base increases, its intensity decreases, and its thickness decreases. The relaxation technique appears to be capable of providing accurate descriptions of the temperature profile in the case of elevated inversions of up to .5 km base height. The analog library and gradient model determines the base heights of inversions up to 1.5 km to within an average of 13.9% of their absolute value. The average absolute height difference between Thermasonde and helicopter observations of the mixing layer is 0.08 km. To maintain a better measure of the mixing depth than that provided by the Thermasonde, helicopter soundings would have to be made at least once an hour. (Author abstract modified)

19019 APTIC NO. 36982

Nigmatullina, K. S.

AEROSOL ATTENUATION OF SOLAR RADIATION. *(Aerozol noye yeslablenie solnechnogo izlucheniya). Text in Russian. Vestn. Mosk. Univ. Fiz. Astron., no. 5:495-500, 1970. 6 refs.*

Observations of ozone and aerosol, i.e., measurements of the intensity of solar radiation in a number of parts of the spectrum, were made at various locations in the Sovient Union in 1965 and 1966. Total ozone concentrations were determined with an ozonometer, direct solar radiation with an electrophotometer, and solar altitude with a theodolite. A high positive correlation was found between the mean coefficient of aerosol attenuation and relative humidity of the ground air layer. There is also a dependence of aerosol attenuation on the wavelength of incident light.

19020 APTIC NO. 36931

Olfe, D. B. and R. L. Lee

LINEARIZED CALCULATIONS OF URBAN HEAT ISLAND CONVECTION EFFECTS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 14p., 1971. 17 refs. (Presented at the American Institute of Aeronautics and Astronautics Aerospace Sciences Meeting, 9th, New York, Jan. 25-27, 1971, Paper 71-13.)*

Steady inviscid linearized flow calculations were determined to estimate vertical temperature profiles over a heated area, representing a city. Initially, planar flow was considered in a stable atmosphere with a constant stability and effective eddy diffusivity. Positive temperature perturbations near the ground which tend to cancel early morning radiation inversions and negative temperature perturbations which produce one or more weak inversions several hundred meters above the city were predicted. Extension to a circular heated area gave a three-dimensional temperature field, but with some decrease in the magnitude of the negative temperature perturbation and in perturbations with distance from the city center in the direction perpendicular to prevailing flow direction. (Author abstract modified)

19021 APTIC NO. 36933

Peterson, James T.

APPLICATIONS OF METEOROLOGY TO NATURAL RESOURCE PLANNING. *Preprint, Air Pollution Control Office, Research Triangle Park, N. C., Div of Meteorology, 20p., 1971 (?).*

The application of meteorology to the planning and management of natural resources with respect to atmosphere, agriculture, forestry, energy, and recreational facilities is reviewed. Agriculture productivity is particularly dependent on climate, including precipitation, drought, and frost. Successful prevention and control of pests and plant diseases and elimination of soil erosion can be significantly aided by climatological consultations. Meteorological data can also be applied to the management of forests, including open burning in logging operations and the fighting of forest fires. Climatological factors also affect the use of solar radiation and wind for energy generation. Modifications by man of natural ecological systems are also discussed including man-made pollution, modifications of land use, depletion of ground water reserves, dam building, and the development of urban settlements.

19022 APTIC NO. 37335

Peterson, James T.

DISTRIBUTION OF SULFUR DIOXIDE OVER METROPOLITAN ST. LOUIS AS DESCRIBED BY EMPIRICAL EIGENVECTORS, AND ITS RELATION TO METEOROLOGICAL PARAMETERS. *(Atmos. Environ.), 4(5):501-518, 1970. 17 refs.*

The relation between sulfur dioxide patterns in St. Louis and meteorological variables was studied by the eigenvector technique. The patterns were derived from mean 24-hour SO2 concentrations measured at 30 locations on 49 days during the winter of 1964-1965. Meteorological data collected were air temperature, surface wind speed and direction, stability, mixing height, and precipitation. The eigenvectors enabled several representative patterns of SO2 throughout the metropolitan area to be delineated. The first three such derived patterns accounted for nearly two-thirds of the variance of the observations; the first six such patterns accounted for 81% of the variance. The day-to-day variability of the derived patterns was explained largely by the meteorological conditions. The multiple correlations between each of the first three eigenvector coefficients and significant meteorological parameters were greater than 0.82; the largest such correlation was 0.89. The relationships established in this study can be used to predict pollutant patterns. (Author summary modified)

19023 APTIC NO. 37638

Petrenchuk, O. P.

SOME DATA ON SULPHUR DIOXIDE CONTENT IN THE BOUNDARY LAYER OF THE ATMOSPHERE. *Idojaras (Budapest), 75(5/6):294-299, Sept./Dec. 1971. 10 refs. (Presented at the Hungarian Meteorological Society, Seminar on Atmospheric Chemistry, July 23, 1971.)*

Fifteen flights, 14 under different meteorological conditions, were carried out in the suburbs of Leningrad in the spring of 1969 to determine the sulfur dioxide concentration in the free atmosphere. Air samples were collected on the ground just before a flight and at 30, 600, 900, and 1200 m or higher. Sulfur dioxide concentrations, as determined by the West-Gaeke method, varied according to the synoptic situation. Under anticyclonic conditions, there was a remarkable increase in SO2 in a subinversion layer. The peak concentration was observed simultaneously with a temperature inversion at some height. Ground-level concentrations were usually low (about 10 micrograms/cu m). During intense air mass transport, there was a nearly uniform distribution of SO2: even at 2600 m the concentration differed little from that at lower levels. Ground-level concentrations were lower than under anticyclonic conditions.

19024 APTIC NO. 37145

Posokhov, Ye. V.

FACTORS FORMING THE CHEMICAL COMPOSITION OF PRECIPITATION. *Sov. Hydrology, Selected Papers, no. 6:640-652, 1968. 62 refs. (Also: Gidrokhim. Materialy, vol. 46:15-31, 1968.)*

The chemical composition of precipitation is influenced by a number of factors. Over the continents the key role is played by aerosols whose composition is determined by the composition of the soils and rocks, the presence of vegetation, climatic, meteorological, and orographic conditions. In coastal regions the aerosols suspended in the air are either of marine or continental origin, depending on soil-geological, climatic, and meteorological factors. The influence of these various factors on the chemical composition of precipitation is discussed, as well as studies which support the various hypotheses. Volcanoes, thermonuclear reactions occurring on the sun, and large industrial centers are also mentioned. (Author summary modified)

19025 APTIC NO. 36960

Quinio. R. Le and J. Hugon

INSTRUMENTS AND METHODS FOR MEASURING ATMOSPHERIC DIFFUSION. *(Appareils et methodes pour la measure de la diffusion atmospherique). Text in French. Commissariat a l Energie Atomique, Saclay (France), Centre d Etudes Nucleaires and Health Physics Society, French Section, Pollut. Radioact. Milieux Gazeux, Proc. Symp., Saclay, France, 1963, p. 175-178. 1 ref. (Nov. 12-16.)*

A method for the study of atmospheric diffusion by means of a flourescent tracer consisting of a disodium salt of fluorescein (uranine) in water solution is described. The method is based on a procedure utilized by Robinson but the autonomy of the sampling devices and the possibility of their transportation by light vehicles allows an independent selection of ground locations for observation. Emission of the tracer is carried out by atomization and subsequent air sampling is done with aspirators provided with Delbag filter paper. Particle settling determinations are carried out on Petri dishes made of pyrex glass. Air sampling and deposit determinations are carried out at preestablished distances from the atomizing emission point under meteorological conditions defined by wind direction and speed, air temperature and humidity, precipitation and vertical temperature gradient, determined at the same time. Laboratory measurements of accumulated tracer in both air and deposit samples are carried out by means of photovoltmeter measurement of the fluorescence of water solutions obtained from washing the respective filters and Petri dishes. This procedure allowed to study the behavior of air pollutants from six important French emission sources, so far.

19026 APTIC NO. 37594

Ramirez, J. M. and R. E. Jensen

WEATHER, CLIMATE AND POLLUTION. *N. Dak. Farm Res., 28(4):66-69, March/April 1971. 8 refs.*

The effect of weather on the dispersion of airborne pollutants and the role of pollutants in climatic change are reviewed. The more hazardous man-made pollutants include carbon monoxide, particulate matter, sulfur oxides, hydrocarbons, and nitrogen oxides. Once they are deposited in the atmosphere, their dispersion is dependent upon the physical properties of the air. The prevailing air motion carries pollutants downwind; the turbulent fluctuations disperse them in other directions. Decisive atmospheric characteristics with regard to dispersion include temperature correlated with altitude, atmospheric stability, inversions, winds, mixing layer, solar radiation, pressure, stagnation, and atmospheric movements correlated with seasonal effects. Conversely, atmospheric constituents and man-made pollutants play a vital role in weather making. Some combustion products could serve as condensation nuclei for cloud formation and eventual precipitation. Air borne dust contributed through soil erosion and dust emissions could eventually reduce the intensity of sunlight and lower earth temperature. Carbon dioxide affects climatic change by altering the thermal balance of the earth through radiational exchange.

19027 APTIC NO. 37057

Shvidkovskiy, Ye. G. and O. K. Kostko

DETERMINATION OF SOME CLOUD PARAMETERS BY LASER RANGING. *(Opredeleniye nekotorykh parametrov oblakov lazernym lokatorom). Text in Russian. Dokl. Akad. Nauk SSSR, 194(6):1316-1317, 1970. 2 refs.*

Backscattering can be used to study the fine structure of a cloud during propagation of laser radiation in a cloud medium. The laser beam propagation path within the cloud is broken down into identical, quite short segments. After determining the profile of the scattering coefficient, sigma (z), within the i-th segment, it is possible to compute the water content distribution, q(z), and the concentration of mean drops, N(z) in the cloud if cloud drop-size function is stipulated. Formulas for q(z) and N(z) are derived. Upper and lower boundaries and scattering coefficient profiles were measured in clouds with low optical density. The results are illustrated by an oscillogram of scattering from an Sc cloud and an oscillogram of scattering from a Cu hum cloud. The scattering profiles correlate well with the shape of the received signal in both cases.

19028 APTIC NO. 37345

Shwartz, Josef and Marshall P. Tulin

CHIMNEY PLUMES IN NEUTRAL AND STABLE SURROUNDINGS. *Atmos. Environ., 6(1):19-35, Jan. 1972. 17 refs.*

A theoretical study of the rise of turbulent smoke plumes in a steady cross-wind and a density-stratified atmosphere is presented. The theory is based on the analogy between the rise of a plume and the rise of turbulent, two-dimensional vortex-pairs. Conservation laws for volume, buoyancy and energy, and a hypothesis of self-similarity are used. The proposed theory predicts that the rise of a buoyancy-dominated smoke plume in a homogeneous atmosphere is proportional to the 2/3 power of its lateral distance from the stack. When the plume rises in a stable density-stratified atmosphere, it will rise initially according to the 2/3 power law, then level off and finally fall back. The maximum plume rise in such cases is proportional to the cube root of the ratio of a buoyancy parameter and the atmospheric stratification parameter; the lateral distance downwind from the stack at which this maximum is reached is proportional to the square root of the same ratio. Comparisons are made between theory and available full scale data, showing generally good agreement. (Author abstract modified)

19029 APTIC NO. 37117

Smirnov, V. I.

THE SCREENING OF CHARGED AEROSOL PARTICLE IN TURBULENT ATMOSPHERE. *(Ekranirovka zaryazhennoy aerozolnoy chastitsy v turbulentnoy atmosfere). Text in Russian. Tr. Tsentr. Aerolog. Observ. (Moscow), no. 79:9-22, 1967. 15 refs.*

The effect on Debye screening of charge can play a considerable role in the interaction of charged aerosol particles, in particular cloud drops, while screening by atmospheric ions is small. The equation which takes into account the effect of coagulation is given. When turbulent dissipation is 100 sq cm/cu sec or more, the screening of aerosol particle charge is considerably reduced. The effect of turbulence on screening is described using a concept of temperature of relative motion of particles. (Author abstract modified)

19030 APTIC NO. 37720

Steinhorst, Gerhard

THE INFLUENCE OF ATMOSPHERIC AEROSOL LAYERS ON THE DEGREE OF POLORIZATION OF THE SKY RADIATION DURING TWILIGHT. *(Einfluss atmosphaerischer Aerosolschichten auf den Himmelsstrahlungspolarisationsgrad waehren der Daemmerung. Text in German. Beitr. Physik Atmpshaere, vol. 44:279-292, 1971. 21 refs.*

The possiblity of obtaining information on atmospheric aerosol at heights up to 130 km by comparing measurements and computations of the spectral degree of polarization of the sky radiation during twilight is discussed. Polarization measurements made in Davos, Switzerland, in Oct. 1968 reveal, at solar depression angles between delta equals 1 deg and delta equals 5 deg, a depolarization in the red and infrared spectrum that is due to the depolarization effect of aerosol layers in the lower stratosphere up to 30 km. The degrees of polarization in the blue spectrum were simulated in model computations that assumed a power law size distribution of the aerosol in these layers. The computations imply that the depolarization effects and their measured diurnal variations are due to aerosol particles permanently present at heights above 70 km. In conformity with the turbidity of the lowest tropospheric region, measurements at the Taunus observatory and at Mainz yield lower degrees of polarization than those made at Mainz yield lower degrees of polarization than those made at Davos, and less information about aerosol layers in the upper atmosphere.

19031 APTIC NO. 37744

Strobel, Darrell F.

NITRIC OXIDE IN THE D REGION. *J. Geophys. Res., 77(7):1337-1339, March 1, 1972. 10 refs.*

One of the most perplexing problems of D-region ion chemistry is the large production rate of the nitric oxide (+) ion that leads to electron densities approximately 10 times larger than observed electron densities when the laboratory value for the dissociative recombination coefficient is used to calculate the NO(+) loss rate. Of all the input parameters for the NO(+) production rate, the NO concentration in the mesosphere is the most uncertain quantity. Theoretical studies and field measurements of NO concentration in the mesosphere disagree. A measurement method sensitive to mesospheric NO is needed; until such a measurement is made, current studies of D-region ion chemistry should use NO concentrations compatible with the constraint of observed electron densities. Theoretical reasons for the adoption of reduced NO concentrations in the mesosphere are outlined and should be considered in the interpretation of observational data. The NO profiles are sensitive to the eddy diffusion coefficient in the mesosphere, the NO dissociation rate, and the NO concentration in the lower thermosphere. Calculations were performed to illustrate the implications of reduced eddy diffusion in the upper mesosphere. The calculated NO profiles have broad minimums between 65 and 70 km with densities of 2-4 times 10 to the 6th/cu cm at 90 km. The NO concentration between 30 and 90 km is sensitive to changes of the mesospheric value of the eddy diffusion but insensitive to changes of the stratospheric value.

19032 APTIC NO. 36967

Sundaram, T. R., G. R. Ludwig, and G. T. Skinner

MODELING OF THE TURBULENCE STRUCTURE OF THE ATMOSPHERIC SURFACE LAYER. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 10p., 1971. 22 refs. (Presented at the American Institute of Aeronautics and Astronautics Aerospace Sciences Meeting, 9th, New York, Jan. 25-27, 1971, Paper 71-136.)*

Theoretical and experimental concepts relevant to the laboratory simulation of the characteristics of the turbulence in the atmospheric surface layer are examined. The simulation of horizontally homogeneous thick constant-stress layers is a necessary prerequisite to simulating more complex atmospheric flows. The conditions of horizontal homogeneity and consistency of shear stress assure that the initial distributions of velocity and turbulence statistics in the laboratory flow are the same as those for the corresponding atmospheric flow. Flow properties to meet similitude criteria for neutrally stable atmospheric flows included vertical distributions of mean velocity, turbulent shear stress, and longitudinal and vertical turbulence intensity. 0

19033 APTIC NO. 37492

Volz, Frederic E.

INFRARED ABSORPTION BY ATMOSPHERIC AEROSOL SUBSTANCES. *J. Geophys. Res., 77(6):1017-1031, Feb. 20, 1972. 23 refs.*

Transmission spectra of natural aerosol substances were obtained from 2.5 to 15 micron by the potassium bromide pellet technique; the spectral variation of the absorption coefficient and the imaginary part of the refractive index of typical aerosol fractions which include sea salt and ammonium sulfate, is presented. Some data for the visual range are discussed. The aerosol fractions, i.e., dry water solubles (evaporation residues), dust (minerals), soot, and benzene solubles, were obtained primarily from rain and snow water. The structured spectra of water solubles from tropical and mid-latitude rains (and aerosol filters) and their concentration are generally similar though more variable in snow, especially in the arctic and in arctic glacier ice. Absorption by dust and soot is less dependent on wavelength, and the influence of soot percentage and water content on infrared aerosol absorption was calculated. Problems of infrared spectroscopy are mentioned. The concentration and absorption spectra of alcohol and benzene extract of dry water solubles indicate that hydrocarbons play a more important role in air chemistry, especially in arctic regions, than previously assumed. (Author abstract modified)

19034 APTIC NO. 37545

Walton, A., M. Ergin, and D. D. Harkness

CARBON-14 CONCENTRATIONS IN THE ATMOSPHERE AND CARBON DIOXIDE EXCHANGE RATES. *J. Geophys. Res., 75(15):3089-3098, May 20, 1970. 18 refs.*

A predominant feature emerging from the box-model treatment of the exchange in the dynamic carbon reservoirs for 1967 and 1968 is the similarity in exchange time when compared with earlier results for gaseous and particulate matter from weapon tests. The similarity in results is even more striking when possible uncertainties in the various parameters are borne in mind. Considerably more data are required, however, from careful studies of ocean mixing patterns, as well as from a detailed investigation of carbon transport in the biosphere. The latter is significant from a mechanistic point of view and will also have a serious bearing on deliberations about the biological hazard resulting from carbon-14. A value of 740,000 C-14 atoms/g air was assumed in this study for the atmospheric carbon reservoir. Since it seems possible that some degree of heterogeneity exists in the true distribution of natural C-14, and because of the effect this may have on the radiocarbon dating method, this possibility merits further investigation. Future C-14 concentrations in the atmosphere are expected to decrease steadily as exchange of carbon dioxide in the dynamic carbon cycle equilibrates the nuclear tests C-14 throughout the various reservoirs. (Author conclusions modified)

19035 APTIC NO. 37325

Wippermann, F.

A MIXING-LENGTH HYPOTHESIS FOR THE PLANETARY BOUNDARY LAYER FLOW IN THE ATMOSPHERE. *(Beitr. Physik Atmosphaere), vol. 44:215-226, 1971. 16 refs. (Presented at the Symposium on Advanced Methods and Problems in Fluid Dynamics, 10th, Rynia, Poland, Sept. 5-11, 1971.)*

Several mixing-length hypotheses are reviewed and a new hypothesis is presented which relates the increase of the mixing-length with height to the decress of the Reynolds stress, i.e., the variation of l depends on an internal fluid parameter and not on the independent variable z (coordinate for the height above the ground). The hypothesis allows the maximum value of the eddy viscosity to be computed. The expression for the mixing length contains only two parameters, the first reflecting the influence of the surface Rossby number and the second the influence of the thermal stratification. An empirical relation is given between the second parameter (the asymptotic value of the nondimensional mixing-length) and the internal parameter for the stratification of the planetary boundary layer.

19036 APTIC NO. 36966

Woodard, Keith

PROBABILITY TREATMENT OF ATMOSPHERIC DISPERSION FOR DOSE CALCULATIONS. *Preprint, American Nuclear Society, Hinsdale, Ill. 22p., 1970. 4 refs. (Presented at the American Nuclear Society, Annual Meeting, 16th, Los Angeles, Calif., June 28 - July 2, 1970.)*

A model for determining dose level versus probability based on combining time variant weather data with the time variant fission product release following a nuclear power plant accident is examined. Utilizing data on atmospheric dispersion coefficients, including ground or elevated release measurements, building wake effects, plume behavior, and meteorological factors, e.g., wind direction, speed, and range, hourly integrated doses in each of 16 direction sectors were computed from which a complete set of dose probabilities was determined. The model quantified the potential dose risk to an individual continuously at a nuclear power plant exclusion boundary as minimal.

19037 APTIC NO. 37091

Wright, R. H.

THE DISSEMINATION OF ODORS FROM KRAFT MILL SMOKE STACKS. *Pulp Paper Mag. Can. (Quebec), 56(5):131-134, April 1955. 14 refs.*

Recent developments in the field of black liquor oxidation combined with measures to absorb digester gases show that the release of kraft mill malodors can be very materially reduced. There is, however, a small amount of residual odor, mainly associated with the stack gases from the recovery plant. The logarithmic relation between concentration of odorant and smell intensity is an obstacle to complete odor elimination, but a very large reduction in the area of the affected territory can be expected. The mathematical theory of smoke dispersion as developed by Sutton is applied to the problem of odors from the stack gases, and the effect of the different variables is shown in a series of curves. Very tall chimneys are not in themselves a practical solution to the problem, and would be justified only under certain special conditions and in conjunction with other measures to treat the stack gases. (Author abstract modified)

19038 APTIC NO. 37508

Yutani, Satoshi

A MODEL OF PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu no moderu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):111, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

For the analysis of the complex photochemical reaction, the development of model is considered one of the most effective methods. Various information necessary for the model was obtained. The amount of ultraviolet rays and distribution of wavelength were calculated according to Leighton s method. The local meteorological and topographical conditions governing the diffusion and transport of the reactant and reaction product were treated by assuming an air parcel according to Wayne s method. The oxidant concentration in nitrogen dioxide-oxygen-hydrocarbon and sulfur dioxide-02-HC reaction systems were cumulatively calculated. Distribution of pollutant sources and their activities were evaluated by classifying the sources into fixed sources (industry) and moving sources (traffic).

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19039 APTIC NO. 36978

CONTINUOUS PULPING TAKES A NEW TACK. *Chem. Week, 86(1):34-35, Jan. 2, 1960. 2 refs.*

A new continuous pulping process has the advantages of high thermal efficiency and of maintaining chips in a fluid state. The process operates as a chain of three recycle liquor links. In each link the wood chips are suspended in pipes and equipment by recycling an excess of liquor. The links are joined by transfer screws which separate the chips from the liquor and move them into the next link. Each link, operating at a different temperature level, is kept at steady temperature by its large mass of liquor. As the wetted chips move from one tank to the next, they alone change temperature. In contrast, the contents of a batch digester must be heated to the cooling temperature and then cooled again. The process is being tested in a 3-ton-per-day pilot plant.

19040 APTIC NO. 37277

Anderson, B., F. D. Shields, and H. E. Bass

VIBRATIONAL RELAXATION IN SO2/02 MIXTURES. *J. Chem. Phys., 56(3):1147-1151, Feb. 1, 1972. 15 refs.*

Measurements of sound adsorption due to vibrational relaxation in sulfur dioxide/oxygen mixtures indicate a vibration-vibration coupling between the asymmetric stretching mode of SO2 and the vibrational mode of 02. The theory of Tanczos, modified to allow for four quantum interchanges, was used to analyze the results. The acoustic absorption measurements of 5% SO2/95% 02 and 10% SO2/90% 02 mixtures enabled a distinction to be made between the series and parallel relaxation schemes in SO2. The measurements indicate that SO2 relaxes by way of the series process with energy passing through the stretching modes into the bending mode by vibration-vibration energy transfer. The SO2/SO2 collisions are of the order of five times as effective as SO2/02 collisions in producing vibration-vibration exchanges within the SO2 molecule. (Author abstract)

19041 APTIC NO. 37359

Bahr, J. L., A. J. Blake, J. H. Carver, J. L. Gardner, and Vijay Kumar

PHOTOELECTRON SPECTRA AND PARTIAL PHOTOIONIZATION CROSS SECTIONS FOR NO, N2O, CO, CO2, AND NH3. *J. Quant. Spectro. Radiative Transfer, 12(1):59-73, Jan. 1972. 20 refs.*

Photoelectron spectra were obtained for nitric oxide, nitrous oxide, carbon monoxide, carbon dioxide, and ammonia over a wide range of photon wavelengths using a dispersed light source. The observations covered the wavelength range 584 to 890 A and photoelectron spectra were, in general, recorded at 5 A intervals in order to survey broad variations in the different photodisintegration processes. Partial photoionization cross sections were measured for all these gases for processes involving transitions to the ground state and the various excited electronic states of the residual ions; in the case of ammonia, cross sections for dissociative photoionization were also determined. (Author abstract modified)

19042 APTIC NO. 37087

Bailey, Philip S.

THE REACTIONS OF OZONE WITH ORGANIC COMPOUNDS. *Chem. Rev., vol. 58:925-1010, 1958. 608 refs.*

The reactions of ozone with organic compounds are extensively reviewed with respect to the mechanisms of ozonolysis of the double bond, the triple bond, aromatic compounds, heterocyclic compounds, and the carbon-nitrogen double bond; ozone as an oxidant; and the utilization of ozonation. The reaction mechanisms for ozone with benzene, naphthalene, polycyclic aromatic hydrocarbons, pyridines, quinolines, amines, arsines, sulfides, aldehydes, ketones, alcohols, ethers, and saturated hydrocarbons, among others, are defined. The conversion of peroxidic ozonolysis products to useful nonperoxidic products through oxidation, reduction, hydrolysis, and decomposition is examined.

19043 APTIC NO. 37104

Barbe, A. and P. Jouve

FORCE CONSTANTS AND FORM OF VIBRATION OF SULFUR DIOXIDE FROM INFRARED SPECTRUM OF S(18)O2. *J. Mol. Spectr., 38(2):273-280, May 1971. 19 refs.*

The infrared absorption spectrum of S(18)O2 in the gaseous state was obtained for the first time. A rotational study of the type B bands enabled the precise location of the band centers and the rotational constants of fundamental and excited vibrational states. Nine fundamental, harmonic, and combination bands were recorded, permitting spectrum analysis. The zero-order wave numbers obtained were 1113.9 reciprocal cm, 505.3 reciprocal cm, and 1335. 1 reciprocal cm. From the zero-order wave numbers of S(16)O2, the force constants, form of the vibrations, the Coriolis coupling constants, and inertia defects were calculated. (Author abstract modified)

19044 APTIC NO. 37755

Bonte, J. AND B. Hugodot

DESIGNING A DEVICE FOR THE PRODUCTION OF MICROCONCENTRATIONS OF GASEOUS POLLUTANTS. *(Realisation d un dispositif pour produire des micro concentrations de polluants gaseux). Text in French. Pollut. Atmos. (Paris), 13(51):229-230, July-Sept. 1971.*

A device developed for sulfur dioxide generation and a modified version for nitrogen oxides generation are described. In the sulfur dioxide generator, based on the principle of the mercury gauge, a bent tube containing two electrodes is included. One end of these electrodes is in contact with the gas flow, and the other with the open air. When the mercury contacts both electrodes, a solenoid vale opens, and the mercury is displaced by the gas flow being admitted until the circuit is broken. Then the solenoid valve is closed, and the mercury electrode contact is established again due to the pressure drop. The differential pressure is a maximum of 2 mm Hg. The sulfur dioxide is fed by a peristaltic pump at a constant rate ranging from 0 to a few cu cm/min. The sulfur dioxide content was checked by means of continuous coulometric titration. In the nitrogen oxides generator, glass tubes are used, and the solenoid valve is operated by an electromagnetic relay. The determination of the nitrogen oxides and the nitric oxide/nitrogen dioxide ratio is made by means of the colorimetric method. With certain modifications, the device can be used for gas mixtures and several gaseous compounds.

19045 APTIC NO. 37656

Castellano, E. and H. J. Schumacher

KINETICS OF PHOTOCHEMICAL OZONE DISSOCIATION AT 313 MILLIMICRON WAVELENGTH. *(Die Kinetik des photochemischen Ozonzerfalles im Licht der Wellenlaenge 313 millimikron). Text in German. Z. Physik. Chem. Neue Folge (Frankfurt), 76(5/6):258-264, 1971. 11 refs.*

The reaction mechanism of photochemical ozone dissociation at 3130 A was studied in experiments carried out at 0-25 C. A scheme including a sequence of nine reactions was developed according to data obtained from similar experiments performed at 2537 A. An equation describing the quantum yield of ozone dissociation was applied to compute rate constants for the reactions. The following sequence of ra relative O(1D) atom deactivation yields, as reflected by different gases, was established: ozone: oxygen: hydrogen: xenon: argon: helium corresponded to 1.0:0.23: 0.19:0:18:0.043:0.012. Based on the assumption that conversion of O(1D) to O(3P) occurs with no activation energy, a figure of 1.1 plus or minus 0.5 Hcal was deduced for the reaction between O(1D) and 03.

19046 APTIC NO. 37056

Charadame, R.

THE AERODYNAMICS OF FLAMES. *Preprint, Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), 19p., 1970. 12 refs. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31-June 3, 1970, Paper Inst. F-NAFTC-1.)*

Research studies carried out by the International Flame Research Foundation and the Centre d Etudes et Recherches des Charbonnages de France on the aerodynamics of flames are summarized. Oil, coke-oven gas, pulverized coal, and natural gas flames were investigated. Specific research areas were variables influencing flame properties, especially radiation; interactions between pure aerodynamic phenomena and physicochemical phenomena occurring in flames; development of the theoretical flame model of flame jets; and tests with both model and industrial-scale furnaces. The studies demonstrated the importance of total momentum flux at the burner for combustion and radiation and the importance of recirculation currents in the pre-ignition phase. The total momentum flux governs the mixing between fluid leaving the burner and the surrounding combustion air: the more the momentum flux increases, the more rapid the mixing becomes and the shorter the flame. While rapid mixing with secondary air retards ignition, rapid mixing with recirculated gases speeds it up. The studies described made it possible to improve the efficiency of pulverized coal boilers, the operation of cement kilns, and gas production from coke ovens.

19047 APTIC NO. 37382

Cusumano, J. A. and M. J. D. Low

INTERACTIONS BETWEEN SURFACE HYDROXYL GROUPS AND ADSORBED MOLECULES. I. THE THERMODYNAMICS OF BENZENE ADSORPTION. *J. Phys. Chem., 74(4):792-797, Feb. 19, 1970. 34 refs.*

Isotherms of benzene adsorption on porous glass (silica) were measured with a recording vacuum microbalance. Heats of adsorption and entropies derived from the data were compared with theoretical values computed for mobile and immobile adsorption. Thermodynamic considerations suggest a model for which benzene molecules are localized and quite strongly bound at low degrees of coverage. The benzene molecules become mobile as the coverage is increased, the adsorbed benzene molecule lying flat with the plane of the ring parallel to the surface and rotating freely in the ring plane. Filling of the micropore structure begins at a fractional surface coverage of approximately 0.6, increasing interaction between adsorbate molecules hinders some of the motion of adsorbed benzene. (Author abstract)

19048 APTIC NO. 37485

Cusumano, J. A. and Manfred J. D. Low

INFRARED RADIOMETRY OF THERMAL TRANSIENTS OF SURFACES. AN APPROACH TO THE STUDY OF THERMAL EFFECTS CAUSED BY GAS-SOLID INTERACTIONS. *J. Catalysis, 17(1):98-105, April 1970. 30 refs.*

A radiometer was used to study the sorption of oxygen on silicon dioxide-supported nickel. Measurements were based on the premise that the energy produced by the gas-solid interaction heats the surfacc of the solid, the radiation emitted by the heated surface then being detected. Rapid thermal transients were observed. The method and some preliminary results are discussed. However, in view of the complexity of the thermal and mass transfer effects occurring on and near surfaces, the precise meaning of the actual temperature measurements must be carefully examined in each case in terms of the physical processes and the assumptions involved. (Author abstract modified)

19049 APTIC NO. 37051

Davis, L. P.

DEPOSITION OF SUBMICRON-SIZE PARTICLES IN VENTILATION DUCTS. *American Assoc. for Contamination Control, Sandusky, Ohio; Health Physics Society, Boston, Mass. and Oak Ridge National Lab., Tenn., Proc. Symp., Surface Contamination, Gatlinburg, Tenn., 1964, p. 131-138. 4 refs. (June)*

The deposition behavior of 0.001 to 1.0 micron particles with concentrations of one to 1000 mg/cu m was analyzed with consideration for the effects of agglomeration. Special attention was given to deposition of particles in the 54 in sq concrete duct that vents several high-level radioactivity facilities to a fan below the main Oak Ridge National Laboratory stack. An equation for predicting concentration decrease due to deposition was developed in a procedure involving numerous approximations (e.g., curve fitting). For the diameters and concentrations investigated, the predicted decrease in concentration due to deposition in the duct can be considered negligible; however, from the viewpoint of contamination of duct walls, the amount deposited should not be overlooked. (Author conclusions modified)

19050 APTIC NO. 37050

Dore, R.

SOME PROBLEMS STATED BY THE PUMPING OF AN EXPERIMENTAL CHAIN OF ISOTOPE SEPARATION BY GASEOUS DIFFUSION. *Vide (Nogent-Sur Marne), no. 82:183-196, July-Aug. 1959.*

At the Congress of Geneva, September 1958, France announced its intention to build a factory for the separation of uranium isotopes by the process of gaseous diffusion. This method, by circulating a gaseous compound of uranium (UF6) through a great number of cells containing porous barriers, makes possible an increase of a lighter isotope, U235, an excellent nuclear fuel. In 1956, the Commissariat a l'Energie Atomique commissioned a study of the construction and use of an experimental chain in Saclay. The problems of vacuum techniques, particularly the phenomena of desorption and corrosion, are discussed. Two problems connected with desorption are non static pumping in a very large installation, and pumping of barriers, which involves the presence of porous materials in a pumping system. To deal with corrosion problems, diffusion pumps, taps, and valves of low-carbon, austenitic stainless steel are recommended. Oil-sealed pumps should be replaced by a dry pump of the helico-compressor type. Gaskets which were resistant to uranium hexafluoride and hydrofluoric acid were developed. Criteria for selecting the proper pump are given.

19051 APTIC NO. 36976

Gentry, James Walter

GASEOUS DIFFUSION PROCESSES INVOLVING AEROSOL PARTICLES IN NON-CONTINUUM REGIMES. *Texas Univ., Austin, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Aug. 1969., 287p. 84 refs.*

The diffusion of ions and gas molecules to aerosol particles in non-continuum regions was theoretically and experimentally investigated. The slip flow coefficient of solid aerosols in mixtures of inert gases was measured. An equation was constructed for the rate of unipolar charging of aerosols in the free and near-free molecule regions and was evaluated numerically for the special case where the interaction between the charged particle and the ions follow the law of Coulomb. Equations describing simultaneous heat and mass transfer to an aerosol particle undergoing evaporation or condensation in the transition region were also developed. A cell model for particle growth was constructed and applied to a collection of solid particles undergoing chemical reactions, determining the influence of cell size, oxidant concentration, and spark size on mixture flammability. Evaporation of drops was also discussed. (Author abstract modified)

19052 APTIC NO. 37048

Geoghegan, G. R. H.

THE THEORY OF SERIES AND PARALLEL DIFFUSION PLANT STAGE CONNECTIONS. *Proc. Symp. Isotope Separation, Amsterdam, Chapt. 41, p. 518-523. (April 23-27.)*

For a diffusion plant with a low output abundance it is feasible to use a single type of stage in the plant rectifier. The size and number of stages can then be optimized to require minimum driving power and the fact that this power is more than would be needed by an ideal plant is compensated for by the reduced cost of construction. For higher output abundance an approximation to the ideal plant must be used; this takes the form of a stepped plant using a small number of square sections, each containing only one type of stage. The effect on plant economy of changes in the number or size of stages in different sections can be evaluated by means of the concepts of stage loading and stage separation efficiency. Sometimes it is preferable to use stages of a small size in parallel in part of a plant instead of designing new ones. The possibility exists, however, that the net flow of material up (or down) the plant will not divide equally between the two available paths. These flows can be controlled only indirectly by very careful adjustment of the operating conditions in the stages and by avoiding too many stages in a loop.

19053 APTIC NO. 37238

Gerstmayr, John W., Paul Harteck, and Robert R. Reeves

PHOTODISSOCIATION OF NITROGEN DIOXIDE BY PULSED LASER LIGHT AT 6943A. *J. Phys. Chem., 76(4):474-477, Feb. 17, 1972. 13 refs.*

Nitrogen dioxide was photodissociated into nitric oxide and oxygen using a pulsed ruby laser at 6943 A. The energy of a single photon at this wavelength was equivalent to only 57% of the dissociation energy. The mechanism proposed to account for the results involves the consecutive absorption of two photons, the first resulting in a short-lived excited state. The second photon is then absorbed by the excited species resulting in dissociation. (Author abstract modified)

19054 APTIC NO. 37044

Keefer, C. E.

SEWAGE TREATMENT - HOW IT IS ACCOMPLISHED. *Smithson. Inst. Annu. Rep., Pub. 4272:363-389, 1956. 1 ref.*

Municipal sewage treatment methods that permit removal at reasonable cost of 85 or 90% of the organic and suspended materials and at least 99% of the bacteria are discussed. The two types of systems in general use are the separate and the combined systems. A separate system consists of two distinct groups of sewers, one called sanitary sewers and the other called storm sewers or storm drains. The combined system of sewers receives sewage both from dwellings, industrial plants, and other sources, and the rain water and surface discharge from highways, roofs, and similar surfaces. Sewage screens, grit chambers, and skimming and sedimentation tanks are noted. Secondary treatment facilities include intermittent sand filters, trickling filters, activated-sludge treatment, and aeration methods. Advantages and disadvantages of using sewage to fertilize and irrigate the soil are cited. Some of the uses of chlorine for treating sewage include odor control, control of trickling-filter flies, trickling-filter ponding, reduction of biochemical oxygen demand, disinfection of sewage, and control of aquatic life. The treatment and disposal of sludge are discussed, including sludge incineration. Costs are briefly indicated.

19055 APTIC NO. 37134

Kelly, Henry C.

VELOCITY MEASUREMENTS OF SMALL PARTICLES BY PHOTON COUNTING. *Appl. Phys. Letters, 17(10):453-455, Nov. 15, 1970. 15 refs.*

Particles moving with known constant velocities were used to calibrate a photon-counting apparatus. A plexiglass disk was coated with one-micron latex particles and rotated in front of the beam of an argon laser. The particles, therefore, moved with a known velocity in thy plane of scattering and perpendicular to the incident light direction. Velocities from 1.0 to 0.00001 cm/sec are measured conveniently.

19056 APTIC NO. 37022

Kirste, H.

PROCEDURES AND METHODS FOR THE EVALUATION OF EMISSION-INDUCED DAMAGE. *(Verfahren und Methoden zur Beurteilung von Immissionsschaeden). Text in German. Landwirt. Forsch. Sonderh., no. 19:176-179, 1965. 4 refs.*

A series of criteria for the improvement of air pollution-induced damage research systematics is reviewed. The scope of a given research should be the determining factor in the methodological set-up of a study. Each study should consist of preliminary work and actual investigation stages. The preliminary stage should include accumulation of information on technology and exhalates produced by the emission source, the location of source and exposed areas, and climatologic and meterological data. The actual investigation should focus on air sampling and analysis, including dust sedimentation, aerosol concentration, and measurement of different gaseous pollutants according to the available preliminary information. Plant damage should be observed macroscopically and investigated by phytopathological and morphological studies. It should be supplemented by chemical analysis of plant material including both pollutant content and important phytoconstituents such as chlorophyll, phaeophytin, vitamins, proteins, and amino-acids. Additional information should be provided by soil analysis for pollutant accumulation, and by soil microbiology. The need for better organized bibliography and more communication between different countries in order to achieve a certain unified way of investigation is emphasized.

19057 APTIC NO. 37478

Low, Manfred J. D. and P. L. Bartner

INFRARED SPECTRA OF ACETONITRILE SORBED ON POROUS GLASS. *Can. J. Chem., 48(1):7-12, 1970. 15 refs.*

Infrared spectra were recorded of acetonitrile sorbed on highly degassed porous glass as well as on silica, boron-, aluminum-, and zirconium-impregnated porous glass and silica. Most of the acetonitrile was weakly and reversibly adsorbed, becoming hydrogen-bonded to surface hydroxyls. A small amount of the adsorbate formed weakly bond surface complexes with Al and Zr-, but not with B-impurities. Spectra were recorded with Perkin- Elmer Models 521 and 621 spectrophotometers. (Author abstract modified)

19058 APTIC NO. 37564

Low, Manfred J. D. and Howard Mark

INFRARED FOURIER TRANSFORM SPECTROSCOPY IN THE COATINGS INDUSTRY. I: INFRARED SPECTRA OF CLEAR COATINGS ON METALS. *J. Paint Technol., 42(544):265-275, May 1970. 8 refs. (Presented at the Federation of Societies for Paint Technology, Annual Meeting, 46th, New York, N. Y., Oct. 25, 1968.)*

The use of Fourier Transform spectrometers to measure infrared spectra is becoming more widespread, and it seems likely that the high sensitivity, speed, and versatility of these instruments can be used to advantage in the coatings industry. The principles of Fourier spectroscopy are briefly outlined and some exploratory measurements of infrared spectra of clear coatings on metals are described. The Fourier Transform spectrometer does not have a monochromator. Dispersion of filtering is not required, so that energy-wasting slits are not needed. The throughput, the amount of radiation which can enter the optics of the Fourier Transform spectrometer, is quite large in comparison to that of a conventional spectrometer. In the conventional spectrometer, each radiation bundle or resolution element of the spectrum is scanned across the detector. Consequently, if there are M resolution elements, the intensity of each element is measured for only a fraction T/M of the total scan time, T. The signal proper is directly proportional to the time spent observing it, while noise, being random, is proportional to the square root of the observation time. The S/N is then proportional to (T/M) to the 1/2 power. With the interferometer, however, the entering radiation falls on the detector, so that each resolution element is observed throughout the entire scan period, with the result that S/N is proportional to T to the 1/2 power. (Author abstract modified)

19059 APTIC NO. 37580

Low, Manfred J. D. and Howard Mark

INFRARED FOURIER TRANSFORM SPECTOSCOPY IN THE COATING INDUSTRY II. OPTICAL SUBTRACTION. *J. Paint Technol., 43(553):31-41, Feb. 1971. 12 refs.*

The operation of a Fourier Transform spectrometer in the dual-beam, optical subtract mode offers the advantages of higher sensitivity and, in suitable cases, infrared spectra can be recorded quickly. Conversely, it is the inherent high sensitivity of the method itself which leads to some experimental difficulties, because the optical balance of the system can easily be destroyed. Fortunately it is possible to eliminate or alleviate instrument drift of the type encountered and to improve instrument performance and sensitivity through the use of better and more appropriate components than were available. Optical subtraction probably can be developed into an attractive technique for differential reflection measurements, film thickness determinations, and especially the measurement of infrared transmission spectra of very small amounts of samples. The use of such instruments to record infrared spectra of coatings and microsamples, and to measure film thickness, is outlined. (Author summary modified)

19060 APTIC NO. 37724

Morlock, D., E. Schuett, and U. Wiesmann

AUTO-DIFFUSION AND FLOW OF GASES IN CAPILLARIES AND CATALYSTS. *(Selbstdiffusion und Stroemung von Gasen in Kapillaren und Katalysatoren). Text in German. Chem. Ing. Tech., 43(24):1320-1328, Dec. 1971. 33 refs.*

The knowledge of the diffusion coefficient in the porous solid substance used is prerequisite to the calculation of important technical processes such as gas cleaning, gas separation, and gas/solid-reactions. The transport of a gas in capillaries and porous solid matter at various pressures is composed of Hagen-Poiseuille-convection and slipping and auto-diffusion in the transitional range. In average Knudsen-numbers, slipping and diffusion have equal shares in the total transport, while the Hagen-Poiseuille-convection plays a subordinate role; the summaric transport flux passes through a minimum. Model conceptions can be confirmed by measurements on capillaries. In order to confirm the validity of these models also with respect to the transport of gases in porous solids, the Knudsen-number and the average pore diameter must be known. Three different methods for determining the pore factor and the labyrinth factor provide deviating values, however. This discrepancy can be explained only to some extent.

19061 *APTIC NO. 37025*

Olds, Jerome

FERTILIZER OF THE FUTURE. Ind. Wastes, 3(3):67-71, May-June 1958.

Research is turning up more and more waste products that have properties of value to the soil. Tests show that waste cellophane flakes stop evaporation, protect soil loss, and control weeds. When mixed with limestone and fertilizer, cellophane can be composted to produce a product with the qualities of commercially available peat. Agricultural experiment station reports show that frit--basically a glass compound--supplies slowly soluble trace elements to the soil. Wood waste is a successful soil builder, and research on bark is being conducted. The chemical composition of some typical waste materials is given: apple pomace, banana residues, basic slag, beet wastes, castor pomace, citrus wastes, coffee wastes, cotton gin waste, cottonseed products, feathers, fish products, felt wastes, grape pomace, leather dust, nut shells, peanut hulls, pea wastes, potato wastes, rice hulls, seaweed, silk mill wastes, and tobacco stems.

19062 APTIC NO. 36977

Opsahl, Arthur William

THE CHEMICAL THERMODYNAMICS OF OSCILLATORY COMBUSTION. *Iowa State Univ., of Sciences and Tech., Ames, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 139p. 69 refs.*

Oscillatory combustion was investigated with respect to predictions of concentrations of combustion products for different values of such parameters as oscillation frequency and amplitude, temperature, pressure, and fuel-oxygen ratio. Acoustical oscillations can cause instability and inefficiency in the energy conversion process, resulting, with industrial furnaces, in great emissions of nitrogen oxides and partially combusted hydrocarbons. Computer calculations are presented for equilibrium compositions and the dynamic or time-varying compositions, including the reaction kinetics, flow characteristics of the system, and the transient behavior induced by the pressure-temperature oscillations. The deviation from equilibrium in flow combustors is significant for trace components (monoatomic oxygen and nitric oxide) which play important roles in the formation of atmospheric pollutants and urban smog.

19063 APTIC NO. 37595

Poland, H. M. and H. P. Broida

FLUORESCENCE OF THE GAMMA, EPSILON AND DELTA SYSTEMS OF NITRIC OXIDE; POLARIZATION AND USE OF CALCULATED INTENSITIES FOR SPECTROMETER CALIBRATION. *J. Quant. Spectro. Radiative Transfer., 11(12):1863-1876, Dec. 1971. 22 refs.*

Fluorescence of the gamma system of nitric oxide was obtained by excitation from both the 2144 A line of ionized cadmium and a continuum source. Individual rotational lines of the 2144 A excited fluorescence spectrum were found to be partially polarized and had polarizations of differing signs. Measured relative vibrational band intensities from line and continuum excitation were compared to calculated Franck-Condon factors. Those factors based on a single potential for the two spin states of the X2pi state agreed better with measured values than those based on separate potentials for the two spin states. Calculated intensities of the v (prime) equals 3 progression were used to calibrate the instrument response in the wavelength region of 2000-2500 A and were checked with measured intensities of the v (prime) equals 0, 1, and 2 progressions. Fluorescence of the epsilon and delta bands were also compared with calculated intensities. (Author abstract modified)

19064 APTIC NO. 36988

Riozzi, Michael Angelo, Jr.

AN INVESTIGATION OF SOME ASPECTS OF CHEMILUMINESCENT AND PHOTOCHEMICAL PROCESSES OF VARIOUS ATMOSPHERIC CONSTITUENTS. *Rensselaer Polytechnic Inst., Troy, N. Y., Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1969, 107p. 81 refs.*

The recombination reaction of nitrogen atoms, metastable oxygen atoms, and the photochemistry of sulfur dioxide are examined. The pressure dependence of the nitrogen afterglow was examined spectroscopically and determined constant in maintaining a discrete band structure. Variation of the intensity with pressure in the 5-20 micron region established the reaction order for the recombination of nitrogen atoms to be less than three. Attempts to generate sufficient numbers of the metastable oxygen atoms to give visible emission included the use of oxygen photodissociation by the 1633 A line of bromine and the achievement of thermodynamic equilibrium in a hot flame where the collisional deactivation of the excited species must follow a parallel reaction of collisional activation by microscopic reversibility. Reactions of SO2 with organics and other materials and its fluorescence and quenching by other molecules were investigated. Photolysis of SO2 with the 2062 A iodine line produced O-atoms which reacted with acetylene and ethylene rapidly, with methane slowly, and not at all with hydrogen or carbon dioxide. The SO2 was consumed in the photolysis of the mixture with CO2. A decrease in the absorption coefficient of pure SO2 for 2062 A for increasing pressure was explained in terms of a layer thickness. A practical device for the detection of SO2 in the atmosphere and for the measurement of SO2 in the exhaust gases of industrial stacks is suggested. (Author abstract modified)

19065 APTIC NO. 37696

Sforzolini, G. Scassellati and A. Savino

OZONE ACTION ON SOME CHEMICAL INDICES OF LIMITED ENVIRONMENTAL CONTAMINATION. *(Azione dell ozono su alcuni indici chimici di inquinamento degli ambienti confinati). Text in Italian. Riv. Ital. Igiene (Pisa), vol. 29:174-190, May-Aug. 1970. 18 refs.*

The effects of ozone in enclosed areas contaminated by cigarette smoke and auto exhaust gas were investigated. The maximum allowable concentration (0.05 ppm) of ozone in a room contaminated with cigarette smoke considerably reduced the carbon monoxide content and oxidized the aldehydes to a limited degree, but has no effect of the nicotine content of the room air. The same concentration of ozone in garage air oxidized the CO to a remarkable degree.

19066 APTIC NO. 37069

Shannon, E. S.

HANDLING AND TREATING PETROCHEMICAL PLANT WASTES: A CASE HISTORY. *Water Sewage Works, 111(5):240-245, May 1964. (Presented at the Oklahoma Industrial Wastes Conference, Oklahoma State University, 14th, Stillwater, Okla.)*

The process waste streams from a petrochemical complex, their origin, and handling and treatment before discharge to the receiving stream are discussed. About once every three months it is necessary to regenerate a catalyst bed in the ethylene plant. This operation was originally vented to the atmosphere and caused an air pollution problem; instead, a water quench system was installed. Liquid waste problems and their solutions were also discussed.

19067 APTIC NO. 37667

Tejwani, G. D. T.

HALF-WIDTH COMPUTATIONS FOR AIR BROADENED CO LINES. *J. Quant. Spectro. Radiative Transfer, 12(1):123-128, Jan. 1972. 19 refs.*

The theory of Anderson, Tsao, and Curnutte was applied to compute half widths of carbon monoxide lines collision-broadened by nitrogen, oxygen, and air. Numerical calculations were carried out on an IBM 360 digital computer. The results are compared with available experimental data, and agreement is good except for the first few lines. (Author abstract modified)

19068 APTIC NO. 37093

Tominaga, H. and N. Toraishi

KINETIC STUDY OF REACTION BETWEEN SO_3 AND H_2S. *(Musui-aryusan to ryuka suiso to no hanno sokudo ni tsuite). Text in Japanese. Nippon Kagaku Zasshi (J. Chem. Soc. Japan), vol. 50:699-705, 1929. 4 refs.*

When sulfur trioxide and hydrogen sulfide were saturated with aqueous vapor, the reaction between the two gases took place very rapidly. When the aqueous vapor pressure was decreased, initiation of the reaction was delayed. These observations suggested the auto-catalytic action of the reaction mixture by aqueous vapor. Solid sulfur added before the reaction did not accelerate it. Thus, reaction time (to one-half pressure) depended on the aqueous vapor pressure; at the same pressure, there was a minimum point between approximately 0-100 C. At OC, vapor from the liquid film probably accelerates the reaction.

19069 APTIC NO. 37582

Ustinov, V. I. and V. A. Grinenko

THE ISOTOPE EFFECT IN THE ELECTRON BOMBARDMENT OF SULPHUR DIOXIDE MOLECULES. *Russ. J. Phys. Chem. (English translation from Russian of: Zh. Fiz. Khim.), 45(7):935-937, July 1971. 12 refs.*

The fractionation of oxygen isotopes in the dissociation of sulfur dioxide by electron impact was studied with a mass spectrometer modified for precision isotope analysis. An isotope separation factor of 1.046 was calculated from the ratios of ionic current with M/e equal to 48, 50, 64, and 66 for SO_2 with natural isotope content SO_2 enriched with 02(18). The experimental separation value was in satisfactory agreement with theoretical separation factors calculated by the Franck-Condon and Bigeleisen methods. The separation data imply that, on dissociation of SO_2 by electron impact, the S-O bonds are not distorted in the resulting transition complex. This is consistent with the hypothesis that the energy of the bombarding electron is not distributed among all the bonds and leads solely to the dissociation of an individual bond.

19070 APTIC NO. 37314

Waite, D. A. and D. Ramsden

THE PRODUCTION OF EXPERIMENTALLY LABELLED AEROSOLS IN THE SUB- MICRON RANGE. *Aerosol Sci., 2(4):425-436, Dec. 1971. 16 refs.*

An apparatus for the production of labelled, stable, insoluble particles of ferric oxide in the size range 0.08-0.5 micron is described. The apparatus has a high overall efficiency, and is very suitable for cases when the amount of material to be nebulized is limited. Characteristics of the particles are examined and the rapid variation of particle density with particle size is studied and explained on a simple semiempirical theory. (Author abstract)

19071 APTIC NO. 37090

Wicker, Warren J.

A NEW LOOK AT REFUSE COMPOSTING. *Public Works, 95(10):131-132, Oct. 1964.*

There is currently renewed interest in composting as a potential major method of handling refuse disposal. In the composting process used in Kingston, Jamaica, refuse is deposited by packer trucks at the receiving bin set below ground level at one end of the plant building. Conveyor belts, in the bottom of the bin, move the refuse to the center from which a second conveyor lifts it to the hopper of the first grinder. The initial grinding reduces the material to about seven inches in size. The material is then moved by another conveyor belt to a second grinder which reduces the material to a maximum dimension of three inches. From the second grinder, the material is carried by conveyor belt to a hopper above a dump truck. As the material moves along the final conveyor, it is seeded with a diluted bacterial 0solution. The refuse falls into the dump truck which moves it to an adjoining composting area. The composting period over-all takes approximately three weeks. During this time, moisture is maintained at about 55%. Temperature within the compost piles, as a result of bacterial action, is approximately 170 F, and by the time the composting has run its cycle, the moisture content has dropped to about 5%. The physical plant in Kingston is described, and the problem of maintenance and breakdown is discussed.

19072 APTIC NO. 37255

Williams, J. E. and J. N. Murrell

STRUCTURE AND STABILITY OF THE NITRIC OXIDE DIMER. *J. Am. Chem. Soc., 93(26):7149-7152, Dec. 29, 1971. 25 refs.*

Approximate nonempirical SCF-MO calculations using a minimum basis of Slater atomic orbitals were made on the most likely structures of the nitric oxide dimer. The planar transconfiguration had the lowest energy. The optimum cis geometry had an energy of 3.5 kcal/mol or higher; the near-rectangular structure suggested by x-ray evidence has an energy of 66 kcal/mol or higher. The dissociation energy of the dimer was estimated on the basis of defined reactions. The resulting value of 3.6 kcal/mol was near the upper limit of the experimental estimates. (Author abstract modified)

19073 APTIC NO. 37451

Zenker, Peter

STUDIES OF THE DUST DISTRIBUTION OF TURBULENT FLOWING DUST-AIR MIXTURES IN PIPES. *(Untersuchungen ueber die Staubverteilung turbulent stroemender Staub-Luft-Gemische in Rohrleitungen). Text in German. Staub, Reinhaltung Luft, 32(1):1-9, Jan. 1972. 38 refs.*

The influence of the particle size of dust, its mass, and the carrier gas velocity on the form of dust profiles was determined by experiments in a vertical pipe 18 m long and 411 mm in diameter. The dust was injected into the drawn-on air prior to entry into the experimental duct. After a length of 14 m, various measuring units and probes were installed in the duct. The dust was collected again in two parallel cyclones at the end of the test duct. Ground glass and limestone was used as test dust. For all dusts, the mass flow density profiles were determined after 5,10 and 14 m duct lengths at an average carrier gas velocity of 12.5 m/sec. For coarse dusts, the concentration and mass flow density were highest in the center of the duct with a nearly linear decline toward the walls. Under the given experimental conditions, this profile prevailed at particle sizes of more than 180 micron. For fine dusts, the mass flow density profile of the solid matter was equal to that of the gas flow, provided no external force other than the force of gravity acted on the flow system. Such profiles occurred at particle sizes below 5 micron. The finer the dust particles and the lower the gas velocity, the more the dust mass moved closer to the wall. The shape of the solid particle flow mass was characterized by the value of the specific dust mass flow at certain characteristic points in relation to the average value of the cross section. Under the given experimental conditions, the influence of the diameter of the flow duct on the shape of the dust profiles could not be determined.

EFFECTS-HUMAN HEALTH

19074 APTIC NO. 36947

National Academy of Sciences - National Research Council, Washington, D. C., Committee on Biologic Effects of Atmospheric Pollutants

FLUORIDES. *Washington, D. C., National Academy of Sciences, 1971. 295p. 751 refs.*

Severe effects of airborne fluoride on man, such as crippling fluorosis, have so far been observed only from long-term occupational exposures. Osteosclerosis, as evidenced by increased density to x-rays, may be associated with a concentration of about 6000 ppm of fluoride in bone. Analysis of urinary fluoride is recommended as a means of monitoring populations for possible excessive exposures to fluoride. The current threshold limit valve for fluorine gas is 0.1 ppm v/v; for hydrogen fluoride, 3.0 ppm; and for particulate fluoride, 2.5 mg/cu m. Environmental sources and forms of fluoride are considered, as well as the fate and transformations of fluoride, its environmental analysis, and general aspects of its effects on living systems. In addition to human health effects, the effects of fluoride on vegetation and animals are considered. Recommendations for future research are made.

19075 APTIC NO. 37079

Abell, C. W. and Charles Heidelberger

INTERACTION OF CARCINOGENIC HYDROCARBONS WITH TISSUES. VIII. BINDING OF TRITIUM-LABELED HYDROCARBONS TO THE SOLUBLE PROTEINS OF MOUSE SKIN. *Cancer Res., vol. 22:931-946, 1962. 42 refs.*

Comparison of the binding of thirteen carcinogenic and noncarcinogenic polycyclic aromatic hydrocarbons to the soluble proteins of mouse skin demonstrated a good quantitative correlation between the binding of the hydrocarbons to a particular protein fraction obtained from mouse skin, which migrates toward the cathode with a relative mobility of plus 0.23 in starch gel electrophoresis, and the carcinogenic activity of the hydrocarbon. The electrophoretic similarity, but not identity, between this fraction and a particular protein fraction from rat liver was established. Studies were also carried out which demonstrated that the same protein fraction in mouse skin is greatly reduced in hydrocarbon-induced carcinomas and sarcomas. These observations support the protein deletion hypothesis of carcinogenesis. The possible relationships between these findings and carcinogenicity are discussed. (Author summary modified)

19076 APTIC NO. 37098

Andervont, Howard B. and Michael B. Shimkin

BIOLOGIC TESTING OF CARCINOGENS II. PULMONARY-TUMOR-INDUCTION TECHNIQUE. *J. Nat. Cancer Inst., vol. 1:225-239, 1940. 36 refs.*

The response of the lungs of strain A mice to intravenous or subcutaneous injection of nine polycyclic aromatic hydrocarbons and three other carcinogens was studied. The following compounds produced pulmonary tumors in the mice whether injected intravenously or subcutaneously: 20-methylcholanthrene; 1,2,5,6-dibenzanthracene; 3,4,5,6-dibenzcarbazole; 3,4-benzpyrene; 15,16-benzdehydrocholanthrene; 4(prime)-methyl-3,4-benzpyrene; 1,2,5,6-dibenzacridine; 1,2,7,8-dibenzacridine; 2-methyl-3, 4 benzphenanthrene; and 2-amino-5-azotoluene. The following compounds did not induce pulmonary tumors in strain A mice: 1,2 benzanthracene; 3-methoxy-10-propyl-1,2-benzanthracene; and collodial thorium dioxide. There was no constant quantitative or qualitative correlation between the ability of a compound to induce pulmonary tumors and its carcinogenicity for cutaneous or subcutaneous tissues. The reaction of the lungs to the carcinogens was surprisingly uniform. With weak carcinogens or with small doses of potent carcinogens, the incidence of pulmonary tumors rose sharply above that of a control group, but few lungs contained more than one nodule. With more potent carcinogens or with higher doses, the multiplicity as well as the incidence of tumors increased.

19077 APTIC NO. 37569

Balazova, G.

LONG TERM EFFECT OF FLUORIDE EMISSION UPON CHILDREN. *Fluoride, 4(2):85-88, April 1971. 4 refs. (Presented at the International Society of Fluoride Research Conference, Annual, 3rd, Vienna, Austria, March 22-25, 1970.)*

Five years after an aluminum smelter began operation, an 8-year study was initiated of the health status of 6 to 14-year-old children living in close proximity to the smelter. In the study area, the daily fluoride intake averaged 1.4 mg from food, 0.4-0.7 mg from air, and 0.1-31 mg/l from water. In a control area, the daily F(-) intake from food was 0.8 mg, and that from air was negligible. No evidence of skeletal fluorosis was found in the exposed children. Nevertheless, the average hemoglobin decreased and the F(-) content of teeth, nails, hair, and urine increased in the children. In teeth, fluoride levels averaged 45.02 mg/100 g (450 ppm) of the original weight compared to 15.71 mg in controls. Nail fluoride levels were 20.9 mg/100 g (209 ppm) for the exposed children versus 14.3 mg/100 g (143 ppm) for the controls. The F(-) content of hair in the affected area averaged 1.6 mg/100 g (16 ppm) compared to 0.75 mg/100 g (7.5 ppm) in the control area. Urinary fluoride values were 0.8 ppm and 0.4 ppm, respectively for the exposed children and the controls. In the smelter area, the urinary excretion of F(-) was lower in the 12-14 age group than in children aged 6-11.

19078 APTIC NO. 37684

Balazova, G.

THE EFFECTS OF A PROLONGED INDUSTRIAL ATMOSPHERIC POLLUTION FROM FLUORINE ON CHILDREN S ORGANISM. *(Der langfristige Einfluss von Fluoremissionen auf den Kinderorganismus). Text in German. Med. Lavoro (Milan), 62(4):202-207, April, 1971. 11 refs.*

The effect of fluorinye emissions from an aluminum factory on the health of children living near the plant was investigated after 8 yrs of plant operation. The absorption of fluorine through food and in the air was examined. The theoretical daily intake of fluorine should be 1.4 mg food and 0.4-0.7 mg from air; in the control zone, the absorption in food was 0.9 mg/day and was practically insignificant in air. The fluorine content of drinkable water in both the control and exposed areas was 0.1-0.3 mg/l. Although no signs of fluorosis detected, the fluorine content of teeth, nails, hair and urine of the children exposed to plant emissions was higher than that of controls. The average values for the exposed and control groups, respectively, were 45.02 and 15.7 mg/100 g in the teeth; 20.9 and 14.3 mg/100 g in the nails; 1.6 and 0.7 mg/100 g in the hair; and 0.8 and 0.4 mg/l in the urine.

19079 APTIC NO. 37023

Barltrop, D.

LEAD POISONING IN CHILDHOOD. *Postgrad. Med. J. (London), vol. 44:537-548, July 1968. 36 refs.*

Childhood plumbism has features that distinguish it from the adult disorder in etiology, presentation, and prognosis. Since the sequelae include death and cerebral damage, it is important that children exposed to lead be identified and those with evidence of poisoning be treated. The metabolism and toxicology of lead in children are discussed, as well as predisposing factors. Pica, seasonal incidence, and clinical features are mentioned. Sources of lead are indicated. The determination of lead in the blood, feces, and urine is described. The presence of abnormal amounts of soft tissue lead may be inferred from the demonstration of characteristic abnormalities of porphyrin metabolism. Increased excretion of delta-aminolevulinic acid and increased free erythrocyte protoporphyrin are mentioned. Various red cell abnormalities are also present, and the reabsorptive mechanisms of the renal tubular cells are impaired. Radiologic aids and lumbar puncture are noted. The three major objectives in management of lead poisoning are the prevention of further absorption, the removal of lead from the soft tissues, and the prevention of recurrence.

19080 APTIC NO. 37630

Barry, Patrick Stephen Ian

LEAD IN THE AMBIENT ENVIRONMENT: A REVIEW OF HEALTH EFFECTS. *(Olovo u covjekovoj okolini. Pregled utjecaja na zdravlje). Text in Serbo Croatian. Nafta (Zagreb), 22(2):97-101, Feb. 1971. 50 refs. (Presented at the Znanstuenog savjeta za naftu pri JAZU, Panel Discussion, Zagreb, Yugoslavia, March 22, 1970.)*

A literature review was undertaken to evaluate the effect of environmental lead on health and to determine the contribution of automobile exhausts to the total lead in the environment. Based on the many studies conducted in different parts of the world over the last 40 years, the presnet daily intake of lead in the general population has not increased, nor is lead from automobile exhausts significant with respect to health.

19081 APTIC NO. 37016

Barth, Delbert S.

EFFECTS OF AIR POLLUTION ON MAN AND HIS ENVIRONMENT. *Society of Automotive Engineers, Inc., New York and Dept. of Transportation, Washington, D. C., Aircraft Environ. Conf., 1971, p. 40-43. 10 refs. (Feb. 8-10, Paper 710326.)*

Air pollutants emitted from turbine engine aircraft may have adverse effects on man and his environment. Carbon monoxide, nitrogen oxides, various organic compounds, and particulate matter are the primary pollutants produced by jet engines. Carbon monoxide at low levels may cause impairment of time interval discriminations and impairment of visual acuity. Nitrogen dioxide has been associated with reduced ventilatory performance and an increase in acute respiratory illness. Some organic compounds, such as formaldehyde and acrolein, may cause eye irritation while excess of particulate matter in the atmosphere has been associated with increased chronic respiratory disease. In addition to effects on human health, pollutants from turbine engines may adversely affect plants, animals, soil, water, and man-made materials. In general, much more research is needed before effects on health and welfare can be specifically related to aircraft emissions. (Author abstract)

19082 APTIC NO. 37007

Battigelli, M. C.

BIOLOGICAL SIGNIFICANCE OF NITROGEN OXIDES. *Society of Automotive Engineers, Inc., New York, Med. Aspects Air Pollut., Detroit, Mich., 1971, p. 10-19. 29 refs. (Jan. 14, Paper 710298.)*

Nitrogen oxides form a ubiquitous family of air contaminants. Of the several components, the most frequently occurring are probably nitric oxide and nitrogen dioxide whose respective average concentrations in urban areas are 0.06 and 0.03 ppm. Little is known about the biologic effects of NO. At continuous concentrations of 0.8 ppm, NO2 occasionally induces structural changes in the small bronchi and alveoli of rats, which suggests an effect compatible with certain features of emphysema in man. As little as 0.5 ppm NO2 can lower resistance of rodents to respiratory diseases. These data are controversial, however, since other animals show no increased susceptibility to respiratory infections, or structural changes, when exposed to 25 ppm NO2 for up to 18 months. There is general agreement that concentrations in excess of 10 ppm can cause morphologic changes (distortion of tissues), with 9.3 ppm likely to cause edema. Data on the effects of long-term exposure to NO2 in humans are scarce, but one study identified a decrease in respiratory performance in school children exposed to mean levels around 0.06-0.101 ppm. 0

19083 APTIC NO. 37297

Beritic, T.

LEAD CONCENTRATION FOUND IN HUMAN BLOOD IN ASSOCIATION WITH LEAD COLIC. *Arch. Environ. Health, vol. 23:289-291, Oct. 1971 1 ref. (Presented at the Conference of Inorganic Lead, Amsterdam, Netherlands, Nov. 29, 1968.)*

As determined by a modified dithizone method, blood lead levels in 13 of 64 patients with lead colic (abdominal) ranged from somewhat less than 40 micrograms/100 ml to just under 80 micrograms/100 ml of whole blood. In 51 of the 64 patients, lead concentrations in blood extended from 80 micrograms/100 ml to over 260 micrograms/100 ml. The fact that all concentrations were relatively low suggests that blood lead levels are not indicative of the existence of lead intoxication. Symptoms of intoxication may be presenin association with lead concentrations below any recognized threshold value, and may be absent when concentrations exceed those known to be potentially dangerous.

19084 APTIC NO. 37593

Bhatacharya, A. K.

AIR POLLUTION – A THREAT TO HUMAN WELFARE. *Chem. Age India, 21(2):85-88, 195-196, Feb. 1970. 7 refs.*

General problems with regard to air pollution, effects on human health, needed research, and the development of air quality guides and legislative measures are reviewed. The principle pollutants are inorganic gases, including carbon dioxide, carbon monoxide, sulfur dioxide, hydrogen sulfide, and nitrogen oxides; organic gases, with ethylene and olefinic hydrocarbons as the primary pollutants; and particulate matter, i.e., dirt, smoke, industrial toxins, radioactive material, and pollens. Air pollution is associated with chronic bronchitis, lung cancer, pulmonary emphysema, bronchial asthma, and acute non-specific respiratory diseases; the associations are supported by data from epidemiologic studies and morbidity records. Air pollution control laws in the United States, USSR, United Kingdom, and India are reviewed.

19085 APTIC NO. 36926

Borisova, M. K.

USE OF THE PLETHYSMOGRAPHIC METHOD IN BASIC STUDIES FOR THE DETERMINATION OF ALLOWABLE ATMOSPHERIC AIR POLLUTANT CONCENTRATIONS. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 103-107. (Translated by B. S. Levine.)*

NTIS: TT61-11148

A triple finger type plethysmograph was examined as a method for the determination of limits of allowable air pollutant concentrations by determining the vascular reactions of an organism. The basic operating principles of the apparatus and test procedures are discussed. The order of observation was established for test runs. Zero plethysmograms were first determined and then, without interrupting the recording, the air-gas mixture was administered and the responses recorded over 30 sec. The gas current was disconnected and the volume changes of the finger vessels for 30-60 sec recorded. The method was used to determine thresholds of reaction with dicloroethane.

19086 APTIC NO. 36928

Borisova, M. K.

MATERIALS FOR THE DETERMINATION OF LIMITS OF ALLOWABLE CONCENTRATIONS OF DICHLOROETHANE IN ATMOSPHERIC AIR. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. V. A. Ryazanov (ed.), Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 49-59. 26 refs. (Translated by B. S. Levine.)*

NTIS: TT61-11148

The effect of dichlorcethane on human health was investigated with respect to threshold concentrations to determine values for maximum allowable concentration limits. Dichloroethane vapor threshold odor perception was 23.2 mg/cu m for most persons and 17.5 mg/cu m for highly sensitive persons. The threshold effect of the vapor concentration on the functional state of the optic analyzer was 60 mg/cu m; concentrations of 6.0, 9.0, 12, 17.5, 23.2, 25, 30, and 50 mg/cu m lowered the sensitivity of the optical analyzer to stimulation by light. Tests of the threshold effect of dichloroethane on vascular reactions and respiration (6.0 mg/cu m) determined the maximum allowable concentration at 4.0 mg/cu m. (Author conclusions modified)

19087 APTIC NO. 37761

Boyd, D. H. A.

THE INCIDENCE OF FARMER S LUNG IN CAITHNESS. *Scot. Med. J. (Glasgow), vol. 16:261-262, 1971. 5 refs.*

In a 5-year period, 11 cases fo farmer s lung were seen in the County of Caithness, Scotland, giving a prevalence in the total population of 7.8/100,000/yr and in the farming population of 110/100,000/hr. A serological survey of 50 healthy farmers revealed four with anti-complementary reactions in the complement fixation test for Micropolyspora faeni and none with positive gel diffusion tests for farmer s lung antibodies. The prevalence of this disease may have a correlation with rainfall. (Author summary modified)

19088 APTIC NO. 36932

Bruin, A. de and H. Hoolboom

EARLY SIGNS OF LEAD-EXPOSURE. A COMPARATIVE STUDY OF LABORATORY TESTS. *Brit. J. Ind. Med. (London), 24:203-212, 1967. 29 refs.*

Previous work has shown that urinary lead, coproporphyrin, and delta-aminolevulinic acid are closely related after exposure to lead. The relationship has been confirmed in 50 automobile workers with different exposures. Porphobilinogen levels have also been estimated. There was some evidence that a raised delta-aminolevulinic acid level gave an earlier sign of lead absorption than a raised coproporphyrin level. Delta-aminolevulinic acid-dehydratase activity was greatly reduced by exposure, on the average to 20% of normal. This reduction in activity was strongly correlated with the increases in urinary lead, coproporphyrin, and delta-aminolevulinic acid. In addition, the serum aspartate aminotransferase and serum alanine aminotranferase levels were estimated and were not affected by exposure to lead. Serum protein patterns and hemoglobin levels were also unaffected. (Author abstract modified)

19089 APTIC NO. 36927

Bushtueva, K. A.

THRESHOLD REFLEX EFFECT OF SO2 AND SULFURIC ACID AEROSOL SIMULTANEOUSLY PRESENT IN THE AIR. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. V. A. Ryazanov (ed.), Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 72-79. 6 refs. (Translated by B. S. Levine.)*

NTIS: TT61-11148

The threshold reflex effect of simultaneous sulfur dioxide and sulfuric acid aerosol exposure was investigated to recheck the standard limits for the simultaneous presence of two or more pollutants. The simultaneous inhalation of SO2 and H2SO4 aerosol in above-threshold concentrations elicited reflex changes in eye sensitivity to light and in optical chronaxy which approximately equaled the sum of changes resulting from individual exposure to the pollutants. The simultaneous effect in concentrations equal to the allowable concentrations (0.05 and 0.03 mg/cu m) on the curves of adaptation to darkness or in the optical chronaxy curve on man was nil. The synergistic effect of simultaneous exposure was active only in concentrations exceeding the maximum allowable limits. (Author conclusions modified)

19090 APTIC NO. 37137

Curwen, M. P., E. L. Kennaway, and N. M. Kennaway

THE INCIDENCE OF CANCER OF THE LUNG AND LARYNX IN URBAN AND RURAL DISTRICTS. *Brit. J. Cancer (London), 8(2):181-198, June 1954. 21 refs. (Presented at the European Section, Union Internationale Coutre le Cancer, London, England, Oct. 19, 1953.)*

Motivated by the striking difference between the trends of mortality in England and Wales from cancer of the lung and larynx, mortality data for 1946-1949 were anlyzed and the anatomic distribution of cancer of the larynx was determined. Mortality from cancer of the larynx changed only slightly in 20 years, contrasted with increased lung cancer mortality. The standard mortality ratio for lung cancer in both sexes, and for cancer of the larynx in men, increased with increasing urbanization. Cancer of thy larynx in females established the reverse trend. The trends applied equally when the figures were analyzed according to separate regions, but there were differences between the regions undetected by the classifications used. In particular, the standard mortality ratio for Wales was very low for the lung and male larynx but very high for the female larynx. Lung cancer mortality in men was positively correlated with the number of persons per acre in the rural districts. The significance of the results with respect to the etiology of the diseases, anatomic and sexual distributions, and the Paterson-Kelly syndrome are discussed. (Author summary modified)

19091 APTIC NO. 37731

Dequidt, J., D. Vaast, and A. Lespagnol

SATURNISM HAZARDS IN LEAD PROCESSING PLANT AREAS. *(Risques d impregnation saturnine au voisinage d usines de traitement du plomb). Text in French. Pollut. Atmos. (Paris), 13(52):289-292, Oct.-Dec. 1971. 7 refs.*

Systematic urine tests were performed on 12-14-year-old childen living in a lead processing plant area. In a control group of 24 children living for at least 2 yrs in areas not affected by lead pollution, the average urine coproporphyrin and delta-aminolevulinic acid content were 79 micrograms/l (25-225 micrograms/l), and 1.786 mg/l (0.8-2.8 mg/l). For the children exposed to atmospheric lead pollution, the respective values were 11 times and 2.5 times higher. The relative frequencies for the amino-levulinic acid and coproporphyrin values can be regarded as significant. Though the values found were far below those characteristic of saturnism, severe poisonings are potentially due to the cumulative effect of lead poisoning.

19092 APTIC NO. 37132

Diamond, Leila and H. V. Gelboin

ALPHA-NAPHTHOFLAVONE: AN INHIBITOR OF HYDROCARBON CYTOTOXICITY AND MICROSOMAL HYDROXYLASE. *Science, 166(3908):1023-1025, Nov. 21, 1969. 13 refs.*

The metabolism of 3,4-benzopyrene to water-soluble derivatives was measured by adding tritium-labeled benzopyrene to hamster embryo cultures and extracting the medium, at specified times, with four volumes of water and 20 volumes of a mixture of chloroform and methanol (2:1 by volume). The extent of binding to benzopyrene to cell components was determined by adding H3-benzopyrene to cover-slip cultures of hamster embryo cells. Results indicated that alpha-naphthoflavone inhibits the metabolism of 3,4-benzopyrene and 7,12-dimethylbenz(a)anthracene in hamster embryo cell cultures and protects the cells against the inhibition of cell multiplication by these carcinogens. Alpha-naphoflavone also inhibits the aryl hydrocarbon hydroxylase activity in homogenates of induced hamster embryo cells and in liver microsomes from rats previously treated with polycyclic aromatic hydrocarbons, but not in microsomes from control rats. (Author abstract modified)

19093 APTIC NO. 37006

Dinman, Bertram D.

BASIC PHYSIOLOGY OF CARBON MONOXIDE. *Society of Automotive Engineers, Inc., New York, Med. Aspects Air Pollut., Detroit, Mich., 1971, 17 refs. (Jan. 14, Paper 710300.)*

While it is necessary to increase the oxygen in air from 10-20% by volume in order to increase 02 saturation of hemglobin from 50-95%, an increase of carbon monoxide in air from 0.005-0.7% by volume increases the saturation of Hb with CO from 8-32%. The laws governing the association of CO and 02 with Hb state that these gases will combine with Hb as a function of their relative pressures. When Hb picks up some CO, unless it is overwhelmed with CO, it still carries some 02 but there is a change in the manner by which Hb gives off or dissociates 02. The shift to the left of the dissociation curve for Hb is referred to as the Haldane shift. Principles of gas transfer in the lung are presented. The partial pressure of 02 and CO in inspired air, the effect of ventilation on CO uptake, and the state of the alveolar membrane as a determinant of CO uptake are discussed. The Forbes nomograph is indicated for determining the rate of CO uptake. Equilibrium of CO with blood carboxyhemoglobin is discussed, including the clearance and elimination of CO from the blood. The effects of CO on myoglobin and enzymes are cited. Effects of acute and chronic doses of CO on the central nervous system and on cardiovascular function are indicated. Urban concentrations of CO and their possible relationship to health impairment are noted.

19094 APTIC NO. 36981

Dluhos, M., B. Sklensky, and J. Vyskocil

EXPERIMENTAL STUDY ON THE EFFECT OF AEROSOL INHALATIONS OF SODIUM HYDROXIDE ON THE RESPIRATORY SYSTEM OF RATS. *(Pokusna studie o pusobeni aerosolovych inhalaci roztoku louhu sodneho na dychaci ustroji krys). Text in Czech. Vnitrni Lekar., 15(1):38-42, 1969. 6 refs.*

Twenty rats were exposed to the effects of aerosol inhalation of 40% sodium hydroxide. Inhalations were administered twice weekly for 20 min over a two and a half month period. Half the animals daily inhaled a therapeutic aerosol of 8% ammonium chloride. Comparison with previous trials revealed that NaOH is a more aggressive substance than sulfuric acid of approximately identical concentration. Following the action of NaOH, the bronchial epithelium was sometimes wrinkled, sometimes flattened, and in places ulcerated and necrotic. The hypertrophic peribronchial lymphadenoid tissues extruded cushion-like onto the bronchial lumen and caused slit-like deformities. Inhalation of NH_4Cl tended to worsen inflammatory changes.

19095 APTIC NO. 36999

Emmerson, B. T.

CHRONIC LEAD NEPHROPATHY: THE DIAGNOSTIC USE OF CALCIUM EDTA AND THE ASSOCIATION WITH GOUT. *Australasian Ann. Med. (Sydney). 12:310-324, 1963. 64 refs.*

In 19 control subjects with normal renal function, the increase in the urinary excretion of lead due to calcium ethylenediaminetetraacetic acid varied up to about 0.6 mg. The EDTA lead excretion was always above this figure in 22 subjects with renal insufficiency of varying degrees attributable to childhood lead poisoning and in patients with significant industrial lead exposure. In 19 out of 23 patients with renal disease attributable to causes other than lead, the EDTA lead excretion was comparable with that of the control group with normal renal function. In patients with chronic lead nephropathy, a significant correlation was also demonstrated between the EDTA lead excretion and both the plasma creatinine level and the plasma carbon dioxide content. A group of patients with renal disease in whom the nature of the renal disease was not readily apparent were investigated by this calcium EDTA technique. Of those whose EDTA lead excretion exceeded 0.6 mg, evidence of excessive past lead absorption likely to be etiologically related to the renal disease could be demonstrated in 12 out of 16 patients. Gout occurred in half the patients with chronic lead nephropathy, occurred infrequently in patients with chronic lead nephropathy, occurred infrequently in patients with chronic renal disease not due to lead or to primary gout. (Author summary modified)

19096 APTIC NO. 37286

Endo, Ryosaku, Tetsutaro Kogo, Osamu Kamata, Hiroshi Shirakawa, Toshiaki Nakajima, and Tatsunori Oya

ON RESIDENTS AWARENESS OF ENVIRONMENTAL POLLUTION TO AUTOMOBILE EXHAUST GASES AND THE EFFECT ON HUMAN BODY. *(Jidosha haishutsu gasu ni taisuru jumin ishiki to shintai eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):411, 1971.*

Investigations of residents awareness of automobile exhaust gases and the effects on the human body were carried out in the summer of 1970 in Otaru, Kushiro, Obihiro, and Asahikawa Cities. Residents reaction was analyzed at regions designated as A (main road), B (crossed road), and C (neighborhood) within a 200 by 150 m range along the road. Carbon monoxide concentration over the standard value was only found in Hanazono district of Otaru; the concentration at Kita-odori of Kushiro was 9.8 ppm/hr, an approximate value to the standard. Residents awareness degree of automobile exhaust gases decreased in the order of Otaru, Kushiro, Asahikawa, and Obihiro. The rates of residents complaints were 38.3% in Otaru and 43.3% in Kushiro. Both rates were higher in the area along the main road. An unpleasant feeling, headache, and pharyngitis occurred frequently at Otaru, Kushiro, and Asahikawa Cities. Symptoms relating to eye and heart disease were significantly high in severely polluted districts such as Otaru and Kushiro Cities.

19097 APTIC NO. 376200

Fel dman, Yu. G. and T. I. Bonashevaskaya

ON THE EFFECTS OF LOW CONCENTRATIONS OF FORMALDEHYDE. *(O deistvii malykh kontsentratsii formal degida na organizm). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(5):174-180, May 1971. 15 refs.*

NTIS: TT 71-50122/2

Human subjects were tested for the effects of brief exposure to formaldehyde, and albino rats were tested for the effects of long-term exposure. Reflex changes in the human organism were evaluated by determining olfactory thresholds and the effects on cerebral biopotentials (with electroencephalograms). In 7 of 15 subjects, the minimum detectable and subliminal formaldehyde concentrations were 0.0073 and 0.054 mg/cu m, respectively. The remaining subjects had higher thresholds. In five of the subjects with the lower thresholds, 0.04 mg/cu m formaldehyde had no effect on cerebral bioelectric activity. However, 0.053 mg/cu m formaldehyde produced statistically reliable changes in all five subjects. Inhalation of 1 mg/cu m (the maximum permissible concentration in industrial air) and

3 mg/cu m formaldehyde by abino rats for three months produced mild cytological and cytochemical alterations in the liver and brain against a background of moderate hyperemia. There was also a syndrome of intensified functional activity of the thyroid gland and adrenals, which is the morphological equivalent of the development of adaption processes in an organism exposed to adverse environmental factors. Exposure to 0.012 mg/cu m formaldehyde (the mean diurnal MPC for atmospheric air) produced no detectable changes in the animals.

19098 APTIC NO. 36957

Feldman, Felix, Herbert C. Lichtman, Stanley Oransky, Eladia Sta Ana, Lloyd Reiser, and Charles J. Malemud

SERUM DELTA-AMINOLEVULINIC ACID IN PLUMBISM. *J. Pediat., 74(6):917-923, June 1969. 12 refs.*

Blood lead and serum delta-aminolevulinic acid levels were determined in groups of children with increased lead absorption, lead intoxication, and lead encephalopathy. Although blood lead values tended to be higher in children with intoxication, they tended to overlap those of patients with increased absorption but without intoxication. Serum delta-aminolevulinic acid was consistently higher in patients with overt toxicity, with almost no overlapping of values. Blood lead and serum delta-aminolevulinic acid levels were both markedly elevated in patients with encephalopathy. Lead and delta-aminolevulinic acid values failed to correlate well. Cerebrospinal fluid delta-aminolevulinic acid values were consistently lower than serum values. Thus, serum delta-aminolevulinic determinations are valuable in selecting infants who are intoxicated from those exposed to increased amounts of lead. (Author abstract) 0

19099 APTIC NO. 37147

Fraumeni, Joseph F., Jr.

19100 APTIC NO. 37722

Fukuda, Masao, Kazuyuki Akiyama, Hiroshi Seki, Hiroko Maeda, Hiroshi Yagyu, and Gen Oui

PRESENT SITUATION OF LEAD POLLUTION EXHIBITED IN PIGEONS. PRELIMINARY EXPERIMENT). *(Hato ni arawaretaru namari osen no genkyo. (Yobi jikken). Text in Japanese. Tokyo-to Eisei-kyoku Gakkai-shi (Rept. Tokyo Public Health Studies) no. 48:22-23, Nov. 1971.*

The degree of pollution in the center and suburban part of Tokyo was determined by measurement of lead in pigeons blood and the content of theta-aminolevulinic acid anhydrase (theta-ALAD) in organs. The estimation of the activity of ALA anhydrase was conducted within 20 hr after 1 ml of blood was taken from the pigeon. After taking out the thigh bones of both legs and kidneys and conducting a wet-type calcination, the estimation of lead in the organs was carried out by dithizone atomic absorption spectrometry. The activity of ALA anhydrase contained in pigeons blood tended to decrease as the lead content increased in each organ. When the situation in the urban area and the suburban part of Tokyo were compared, the difference in the lead content in organs was ten-fold on the average. In the amount of lead and of the activity of ALA anhydrase, fluctuations were evident. The pigeon can be a significant biological index of lead pollution.

19101 APTIC NO. 37240

Gerdes, R. A.

THE INFLUENCE OF ATMOSPHERIC HYDROGEN FLUORIDE ON THE FREQUENCY OF SEX-LINKED RECESSIVE LETHALS AND STERILITY IN DROSOPHILA MELANOGASTER. *Fluoride, 4(1):25-29, Jan. 1971. 8 refs. (Presented at the Conference of the International Society of Fluoride Research, Annual, 3rd, Vienna, Austria, March 22-25, 1970.)*

The influence of hydrogen fluoride as an atmospheric contaminant was investigated in the Oregon-r strain of Drosophila malanogaster. Two principle parameters of mutagenicity were used: sex-linked recessive lethals and sterility. The flies were exposed in fumigation chambers to 1.3, 2.9, or 4.3 ppm HF for three or six weeks. Sex-linked recessive mutation frequency increased at each level of sublethal concentration. The frequencies of sterility in both males and females increased with increased treatment level and treatment period. Genetic differences were observed in the response of the progeny of treated flies. The sex-linked recessive lethals indicated an effect on a specific chromosome; the increased sterility levels resulted from a broad effect on the genome as a whole. (Author abstract modified)

19102 APTIC NO. 37551

Goldstein, Inge F.

INTERACTION OF AIR POLLUTION AND WEATHER IN THEIR EFFECTS ON HEALTH. *HSMHA (Health Serv. Ment. Health Adm.) Health Rep., 87(1):50-55, Jan. 1972. 25 refs.*

The numerous studies that have tried to show causal relationships between normally occurring air pollution levels and disease have met with little success because the effect of weather on health has not been effectively separated from that of air pollution. The effects are unlikely to be separated by many of the approaches previously used, in particular by studies restricted to a single area. Further, the independent effect on health of either air pollution or weather in two areas cannot be studied unless one hypothetical causal variable varies and the other can be controlled. The most promising approach is that which compares areas within cities with similar weather conditions and similar social and demographic characteristics but different exposures to air pollution. This temporospatial approach may provide answers to these basic questions; Does air pollution affect health; Does weather effect health? Do weather and air pollution have a synergistic action on health?

19103 APTIC NO. 36929

Gusev, M. I.

LIMITS OF ALLOWABLE LEAD CONCENTRATION IN THE AIR OF INHABITED LOCALITIES. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. V. A. Ryazanov (ed.), Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 5-31. 29 refs. (Translated by B. S. Levine.)*

NTIS: TT61-11148

Experiments on chronic exposure of laboratory animals to lead oxides were performed to help in determining maximum allowable concentrations in the atmospheres of inhabited locations. White rats and rabbits exposed to 10-11 gamma/cu m lead oxides for six hours daily exhibited physiological and patho-anatomical changes. Pathologic and histologic changes were determined in the blood organs, and tissues, especially in the brain and spinal cord of exposed rats. The content of lead in the bones of rats exceeded by 10 times the content of control animals; accumulation of lead in the bones of rabbits was eight times as great. Experimental results set the maximum allowable 24-hour average concentration in the USSR at 0.7 gamma/cu m; the limit for single concentrations was 10 gamma/cu m. (Author conclusions modified)

19104 APTIC NO. 37679

Harington, J. S., Gwen M. Macnab, Klara Miller, and P. C. King

ENHANCEMENT OF HAEMOLYTIC ACTIVITY OF ASBESTOS BY HEAT-LABILE FACTORS IN FRESH SERUM. *Med. Lavoro (Milan), 62(4):171-176, April 1971. 17 refs.*

The weak in vitro hemolytic and cytotoxic effects of amosite and crocidolite asbestos, which are fibrogenic to man and animals, were investigated. The direct hemolytic activity of these and five other varieties of amphibole asbestos on erythrocytes was enchanced when fresh serum was present in the test system. This sensitizing action to lysis by serum is not shared by the serpentine form of asbestos, chrysotile, nor by quartz powder. (Author summary modified)

19105 APTIC NO. 37566

Heyder, J. and C. N. Davies

THE BREATHING OF HALF MICRON AEROSOLS–III. DISPERSION OF PARTICLES IN THE RESPIRATORY TRACT. *Aerosol Sci., 2(4):437-452, Dec. 1971. 8 refs.*

Experiments on the inhalation of 0.5 micron diameter particles are described. Effects of separately varying tidal volume and expiratory reserve volume were studied, and the results are consistent with the idea that mechanical mixing within the tidal air and between the tidal and reserve air takes place only in the anatomical dead space of the lungs. Experiments with constant reserve volume on the inhalation of a bolus or slug or aerosol, followed by clean air to complete the tidal inhalation, showed that the depth of penetration of the aerosol into the reserve air was not much less than when aerosol was inhaled for the entire tidal inhalation. Thus, the first part of tidal air which penetrates most deeply is not much affected by the volume subsequently inhaled, because it is in the alveolated airways where there is no mechanical mixing of air. A compartment theory of the dispersion of particles in the lungs, based on tidal, reserve, and residual volumes, enables six transfer coefficients of aerosol particles to be evaluated from wash-in and wash-out experiments. With these coefficients it is possible to predict the behavior of aerosols during various breathing maneuvers. (Author abstract modified)

19106 APTIC NO. 37039

Higgins, I. T. T.

SULFUR OXIDES AND PARTICULATES. *Society of Automotive Engineers, Inc., New York, Med. Aspects Air Pollut., Detroit, Mich., 1971, p. 20-33. 114 refs. (Jan. 14, Paper 710299.)*

There is good evidence that exceptional episodes of pollution cause morbidity and mortality. While pollution primarily affects those already suffering from disease, particularly of the lungs or heart, some studies, especially of children, suggest that pollution can initiate disease as well as exacerbate it. Particulate and sulfur oxides pollution probably plays a considerable role in the development and progression of bronchitis and emphysema. On balance, the evidence suggests that it contributes to the toll of lung cancer. Although knowledge of the levels of pollution that can be regarded as safe is inadequate, results of studies directed at establishing dose/response relationships suggest that average annual levels of smoke (or particulates) and of sulfur dioxide should both be 100 micrograms/cu m or less. Air pollution episodes and a follow-up study of the Donora episode are cited. Variation in mortality, morbidity, and lung function over time is discussed, and geographic areas are compared. Urban/rural gradients of respiratory disease mortality are described, and Yokohama and New Orleans types of asthma are noted. (Author summary modified)

19107 APTIC NO. 37503

Ito, Yoko, Minoru Nagata, and Tatsuhiko Tsuji

DIAGNOSIS OF RESPIRATORY SYMPTOMS OF INHABITANTS AROUND A CERTAIN REFINERY BY ORAL COMMUNICATION. *(Bo seirensho shuhen jumin no kokyuki shojo monshin seiseki). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):426, 1971.*

An epidemiological survey was made using the British Medical Research Council oral communication technique for inhabitants over 30 years of age (383 males and 451 females) living around a zinc and cadmium refinery which was damaging plants and farming crops by exhaust smoke; chronic nonspecific lung disease groups were screened. A farming area was chosen as a control and the inhabitants over 30 years of age (379 males and 520 females) were surveyed. The proportion of those who have respiratory symptoms indicated a high rate in the surrounding factory area and control area; the proportion of those who had symptoms was larger in men than women. Between respiratory symptoms (cough, sputum, and short breath) and age, there was a positive correlative tendency both in men and women in both areas. With respect to sexual difference in bornchitic symptoms, in the ratio of men to women in the same area, that of men was two to three times larger than women in both areas. Also, data concerning the relationship between smoking and bronchitic symptoms were obtained.

19108 APTIC NO. 37387

Izmerov, Nikolai F.

ESTABLISHMENT OF AIR QUALITY STANDARDS. *Arch. Evriron. Health, 22(6):711-719, June 1971. 30 refs.*

Health effects of acute exposure to air pollutants, goals for air pollution control, and the importance of adaptation and reflex mechanisms are reviewed, as well as the role of the World Health Organization in air pollution. The possibility of extrapolating to man the results of experiments on laboratory animals exposed to toxins is also considered. Determination of the boundary between physiological adaptation, which does not involve stress, and the possibility of pathological reactions occurring, which require compensation of the disturbed functions in order to maintain normal interrelationships between the organism and the environment, is a most important task. The body surfaces which come into contact with environmental factors -- the surfaces of the skin, gastrointestinal tract, and respiratory tract, are copiously supplied with sensitive receptors and act as reflexogenic zones. The importance of reflexes stimulated by odorous substances is considered. The World Health Organization is giving advisory and technical assistance to various countries in the study of atmospheric pollution. WHO s Expert Committee on Enviromental Sanitation has studied the nature and cause of air pollution, methods of determining polluting substances in the atmosphere, the results of air pollution, and methods for preventing and controlling it.

19109 APTIC NO. 37510

Jericho, K. W. F., P. K. C. Austwick, R. T. Hodges, and J. B. Dixon

INTRAPULMONARY LYMPHOID TISSUE OF PIGS EXPOSED TO AEROSOLS OF CARBON PARTICLES, OF SALMONELLA ORANIENBURG, OF MYCOPLASMA GRANULARUM, AND TO AN ORAL INOCULUM OF LARVAE OF METASTRONGYLUS APRI. *J. Comp. Pathol., vol. 81:13-21, 1971. 15 refs.*

Four different inocula were introduced into the lungs of pigs to study their influence on the distribution and histogenesis of lymphoid tissue in the right lungs. No increase of lymphoid tissue was detected in lungs of pigs exposed to an aerosol of carbon particles or of Mycoplasma granularum. An aerosol of killed Salmonella oranienburg produced macroscopic petechial hemorrhages in some lungs and an increase of lymphoid tissue was calculated at the alveolar level of some inoculated lungs. In lungs of pigs inoculated orally with larvae of Metastrongylus apri, an initial uniform distribution of larvae in all lobes was followed by more parasites per unit of lung tissue in the posterior part of the older lungs. This parasitic distribution could be correlated directly with the lobar distribution and progressive increase of intra-pulmonary lymphoid tissue. Pulmonary lymphatics were regularly seen within or adjacent to lymphoid tissue foci. With progressive growth of the lymphoid tissue aggregates a close contact with the respiratory epithelium was noted. (Author summary)

19110 APTIC NO. 37362

Kabayama, Hisao

AIR POLLUTION AND EYE-TROUBLE WITH EMPHASIS ON PHOTOCHEMICAL SMOG. *(Taiki osen to gan shogai. Kokagaku sumoggu o chushin to shite). Text in Japanese. Ganka (Ophthalomol.), 13(12):1091-1099, Dec. 1971. 5 refs.*

Outbreaks due to eye problems centering in Toshima Hospital, Tokyo, and special features and differential diagnosis from other eye diseases caused by oxidants, and their prevention and treatment are explained. On the 23rd of July 1970, the window side of wards on a higher floor were damaged; on the 24th, both patients and hospital staff complained of sore eyes in the wards on the fifth floor; among serious cases, objective symptoms which seemed to be caused by oxidants were evident. Until then, approximately 50 outpatients had complained; most of them did not seem to be caused simply by oxidants. Thus, the patients who seemed damaged by oxidants were 10. The special features of eye trouble caused by oxidants are sore eyes and a flow of tears. When photochemical smog occurred, preventive measures included staying in rooms downwind or curtaining off the smog. It was also considered necessary to consult an ophthalmologist instead of being treated at home. Detailed case reports on two patients seriously injured are included.

19111 APTIC NO. 37337

Kaburagi, Sukekata, Gen-ichi Tokita, and Misa Matsumura

RELATION BETWEEN RESPIRATORY DISEASE AND AIR POLLUTION IN FUJINOMIYA DISTRICT OF SHIZUOKA PREFECTURE. (PART I). *(Shizuoka-ken Fujinomiya chiku ni okeru kokyuki kei shikkan to taiki osen tono kankei ni tsuite no chosa (Dai 1 po). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):423, 1971.*

Patients which colds, acute bronchitis, asthma bronchiale, bronchitis with asthmatic attacks, chronic bronchitis, pharyngitis, and allergic rhinitis in Fujinomiya City and Shibakawacho were examined during March 1969 and February 1970. These two districts are contiguous to Fuji City where serious air pollution is caused by many paper manufacturing factories. During the investigation, monthly average concentration of sulfur dioxide was 0.023 0.037. Morbidity of acute bronchitis in these districts was lower than that of Fuji City, but bronchitis with asthmatic attacks was the same as in a non-polluted district of Fuji City. Though the effect of air pollution of Fuji City was clearly observed in Fujinomiya City a correlation between meteorological conditions, observed at the same time, and occurrence of respiratory diseases was not found.

19112 APTIC NO. 37453

Kawaraie, Toshio

THE AMOUNT OF CARCINOGENIC HYDROCARBONS IN THE AIR IN OSAKA CITY. PART 6. BIOASSAY OF CANCER ACTIVITY. *(Osaka-shi no taikichu hatsugansei tanka suiso ryo. Dai 6 po. Gan kasseido no bioassay). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):430, 1971.*

The total amount of carcinogenic hydrocarbons in airborne dust in an urban area was determined chemically and simultaneously by a bioassay on a protozoan (Paramecium caudatum (PC)). The effect of hydrocarbons such as benzo(a)pyrene(BaP), 1.12-benzperylene, chrysene, pyrene, and coronene were examined. Lethal Ratio (LR) after 250 min incubation was zero. When the effect of ultraviolet radiation was examined, LR increase was found after 35 min in the case of relative power 0.4, and reached 100 after about 60 min. In the photodynamic bioassay caused by the change in toxicity of hydrocarbons, LR increased immediately after irradiation with BaP 10 to the minus 7th power g/ml and reached 100 after 7 min. Lethal time required for 90% of protozoan was ordered BaP less than 1.12-Benzperylene less than Chrysene less than Perylene less than Coronene.

19113 APTIC NO. 37296

Keeri-Szanto, M. and J. R. Pomeroy

ATMOSPHERIC POLLUTION AND PENTAZOCINE METABOLISM. *Lancet, 1971: 947-949, May 8, 1971. 6 refs.*

A study of the use of pentazocine for supplementing nitrous oxide relaxant anaesthesia in 41 patients revealed a statistically significant correlation between high drug requirements and urban living as well as smoking habits. The excess drug requirement resided in the need for higher maintenance doses rather than in different priming doses for the subgroups, implying increases in the metabolization rate of pentazocine. These findings suggest that drug metabolism is affected by enzyme induction triggered off by atmospheric pollution – ambient of self-induced. This type of enzyme industion will likely be found for many other drugs and in other therapeutic settings.

19114 APTIC NO. 37229

Kettner H. and A. Hampel

POLLUTANTS IN THE AIR AND THEIR EFFECT ON THE HUMAN ORGANISM. *(Schadstoffe in der Luft und ihre Einwirkungen auf den menschlichen Organismus). Text in German. Wasser Luft Betrieb, 15(12):441, Dec. 1971.*

Exposure of the human organism to lead concentrations of 1 microgram/cu m air causes, in the long run, an increased discharge of coproporphyrin, i.e., in effect a disturbance of the metabolism. A similar effect is achieved by a carbon monoxide concentration of 2 mg/cu m. Concentrations of Pb and CO of the above magnitude are found in the atmosphere more than 50% of the time. The present methods of ventilation of homes and offices are ineffective, so such concentrations are also found indoors. The Institute of Climatology is presently conducting measurements, which are at the moment limited to sulfur dioxide, CO, Pb, aerosols, and aldehydes, for determination of the pollutant concentrations in the air which begin to affect the well being of man.

19115 APTIC NO. 37640

Kitabatake, Masayoshi, Yoshikazu Takatsuka, Katsumi Yoshda, Masayuki Imai, and Hidehiko Oshima

EFFECT OF SO2 AND H2SO4 MISTS ON EXPERIMENTAL ASTHMA IN GUINEA PIG. *(Moromotto no jikken zeisoku ni oyobi SO2 oyobi H2SO4 mist tou no Eikyo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):418, 1971.*

Four groups of guinea pigs were exposed to mists of sulfur dioxide, sulfur trioxide and to carbon particles and SO2 for 30 minutes. Immediately after the treatment, these four groups and a control group were also exposed to albumin mist for 30 min. Treatments were repeatedly carried out twice a week. A respirogram, fluctuation of eosionphiles and histamin contents of lung were examined. Frequency of attacks were highest in the group exposed to SO2 plus SO3 with mist. The permeability of the antigen is accelerated by the inhalation of SO2 with SO3 and SO3 mists, and antibody formation is promoted. Compared with control group, attacks tended to occur easily and frequently in the group exposed to SO2 with carbon particles and the group of SO2 exposure. Also in these two groups, increase of acidocyte was observed before albumin exposure.

19116 APTIC NO. 37501

Kobayahi, Takeshi

STUDIES ON THE EFFECTS OF AUTOEXHAUST GAS IN LOW CONCENTRATIONS. REPORT 2. EFFECTS ON THE MAZE LEARNING ABILITY OF RATS. *(Jidosha haikigasu no eikyo ni kansuru kenkyu. Dai 2 ho. Ratte no meiro gakushu noryoku ni oyobosu eikyo ni tsuite). Text in Japanese. Yokohama Igaku (Yokohama Med. J.), 22(2):125-138, June 1971. 31 refs.*

Carbon monoxide at concentrations of 20 - 30 ppm produced by a gasoline engine was diluted in an air-tight room; 20 male rats were given preliminary training three hours a day and six days a week in a U-shaped maze. From among those which had about the same learning ability, six were chosen as a test group and five as a control group. A running maze test was carried out together with the control group once every other day, three times a week as a rule, for 510 days as the longest period, 188 times by exposing the test group to exhaust gas. Surviving rats through the test period were 4 out of 6 in the test group, and 3 out of 5 in the control group. As a result of examinations of mortality by sampling (risk rate was five %), no significant difference was evident. The number of individual failures made during the time of running the maze increased and decreased greatly until the 270th day in both groups; after the 270th day, the number became smaller and a tendency of maximum learning became evident. Quantitative differences due to the accuracy of learning were not evident in either group. From approximately the 330th day a difference appeared in running time; after the 416th day, the time needed for running was also estimated. The change was small in the control group and the running time was 29.3 sec on the average. In the test group, as its fluctuation was big, approximately 2.8 times showing a marked difference with 82.9 sec on the average was confirmed, and a qualitative difference of learning was distinctly shown. In parallel with the maze test, examination of growth (rat, mouse, rabbit), finding in blood (rabbit), quantity of motion using rotating wheel (mouse), pregnancy, and delivery and growth of mice born to females exposed to exhaust gas were conducted, the results of which will be published elsewhere.

19117 APTIC NO. 37621

Leroux, Robert

AIR POLLUTION IN NON-INDUSTRIAL TOWNS AND HUMAN ECOLOGY IN THE CITY. *(La pollution de l air des villes non industrielles et ecologie humaine dans la cite). Text in French. Rev. Ing. Ind. (Belgium), no. 10:407-416, Oct. 1971. 23 refs.*

Air pollution has a totally different character in non-industrial towns than in industrial areas and cities. Smog cases which occurred in Engis (Belgium), Donora (USA), and London (England) are analyzed. The Engis smog was of non-industrial character. Pulmonary and cardiac diseases in smog are supposed to be related with positive ionization of the air, and the lack of negative ions. Oxygen can be bound by pulmonary alveoles in the presence of negative ions only. In smogs, correlations can be observed between a high concentration of positive ions and carbon dust in the air. Smog can be dissipated by propane injections (at Orly aerodrome, Paris, for example). The mutual arrangement of residential and industrial areas should be determined with respect to dominant wind directions. In periods without smog, air pollution in non-industrial areas is on minor importance, its effects are mainfest, though: corrosion of tin roofs due to sulfur dioxide, deterioration of walls due to sulfur dioxide, or the combined action of ammonia, humidity, and nitrifying bacteria. Also, the pollution due to exhaust gases of automobiles creates an ever-growing problem. Green areas in or around towns and cities are useful in maintaining the thermohygrometric equilibrium. Man has inherent resistance against microbial air pollution as the majority of pathogenic microbes are anaerobic. Pollution control aspects should be duely considered in city and traffic planning.

19118 APTIC NO. 37129

Levin, Morton L., William Haenszel, Benjamin E. Carroll, Paul R. Gerhardt, Vincent H. Handy, and Samuel C. Ingraham, II

CANCER INCIDENCE IN URBAN AND RURAL AREAS OF NEW YORK STATE. *J. Nat. Cancer Inst., vol. 24:1243-1257, 1960. 17 refs.*

New York state age-adjusted incidence rates for several cancer sites are compared with rates reported from Connecticut and Iowa. Despite some differences among the states, there is substantial agreement on the approximate magnitude of the rates for several cancer sites in urban and rural areas and also agreement in the urban-rural ratios of the rates. These ratios are generally lower among females and vary by site, high urban-rural ratios appearing for the esophagus (males), intestine and rectum (males), and respiratory system. Within New York State, the urban excess for specific sites appears in both metropolitan and nonmetropolitan counties. The presence of urban-rural differentials in nonmetropolitan counties indicates that they do not result solely from special conditions prevailing in the largest urban centers.

19119 APTIC NO. 37028

Makotchenko, V. M.

ON THE FUNCTIONAL CONDITION OF CORTEX OF ADRENAL GLANDS ON CHRONIC INTOXICATION BY HEAVY METALS (LEAD, MERCURY). *(Funktsional noye sostoyanie kory nadpochechnikov pri chronicheskikh otravleniyakh tyazhelymi metallauri (svinets, rtut). Text in Russian. Tr. Ukr. Inst. Eksp. Endokrinol., vol. 20:162-170, 1965. 20 refs.*

The steroid function of adrenal glands was studied on a group of people with chronic occupational intoxication by lead and mercury. Various clinical symptoms are discussed. Chronic intoxication by heavy metals is accompanied by decreased functioning of the cortex adrenal glands and by decrease of their functional reserves. During mercury intoxication, the functional reserves are markedly decreased; in lead intoxication, the decrease in function of the adrenal glands is directly proportional to the period of contact with lead and the intensity of intoxication.

19120 APTIC NO. 37146

Manos, Nicholas E. and Gail F. Fisher

AN INDEX OF AIR POLLUTION AND ITS RELATION TO HEALTH. *J. Air Pollution Control Assoc., 9(1):5-11, May 1959. 4 refs.*

Mortality ratios for 50 causes of death in seven population groups were correlated with 30 different indices of air pollution based on home heating, nonspecific industries, specific industries, and motor vehicle usage. Socio-economic factors and other city characteristics were taken into account. Based on the 10,176 linear correlations computed, four causes of death have a high positive correlation with air pollution indices. They are: malignant neoplasm of esophagus and stomach; malignant neoplasms of the trachea, bronchus, and lung; arteriosclerotic disease, including coronary disease; and chronic endocarditis not specified as rheumatic, and other myocardial degeneration.

19121 APTIC NO. 37142

Mazaleski, S. C., R. C. Duncan, R. L. Coleman, C. H. Lawrence, and C. A. Nau

TRACE METAL CHANGES FOLLOWING CHRONIC CARBON MONOXIDE INTOXICATION. *Missouri Univ., Columbia, Proc. Missouri Univ. Fourth Annu. Conf. Trace Substances Environ. Health, Columbia, Mo., 1970, p. 290-300. 30 refs. (June 23-25.)*

Effects of chronic carbon monoxide intoxication in rats as reflected by trace metal changes were investigated. Concentrations of zinc, copper, iron, and magnesium were determined in the brain, heart, kidneys, lungs, spleen, blood serum, packed red blood cells, and urine by atomic absorption spectroscopy. Approximately nine chronic and six control rats were sacrificed every three weeks until the 12th week exposure period was terminated. All groups of rats were treated identically except the chronic group, which was exposed to 50 ppm CO 5 hr/day, 5 days/week. Statistically significant changes were observed in the four metal species. Carbon monoxide exerts a trace metal effect at the current threshold limit value. (Author abstract modified)

19122 APTIC NO. 37035

McNamara, Bernard P.

TOXICITY OF BORON EXHAUST (BORIC OXIDE). *Chemical Warfare Labs., Army Chemical Center, Md., Health Haz. Mil. Chem., Trans. Symp., 1958, p. 73-84. 7 refs.*

NTIS, DDC: AD 202488

Rats and guinea pigs were studied for the effects of repeated exposure to airborne particles of pure boron oxide (B203), a constituent of rocket and jet-engine exhaust. Ten rats exposed to 40 mg/cu m of B203 aerosol for six weeks and 10 rats exposed to 100 mg/cu m for 10 weeks did not differ from controls with respect to weight gain; water consumption; blood values for total protein, nonprotein nitrogen, creatinine, glucose, lactic acid, or phosphorus; and urine values for albumin, glucose, pH, or volume. There was indication that the creatinine content of urine increased after four-week exposure at 100 and 500 mg/cu m B203. Following four-week exposure at 40 mg/cu m, rat urine contained an average 18 mmg boron/cc urine. No toxic signs appeared in guinea pigs, who were exposed to 40 mg/cu m B203. Application of one gram of B203 to wet rabbit skin caused a reddening of skin but no other signs.

19123 APTIC NO. 37540

Milic, S., M. Stankovic, and Vera Delic

EFFECT OF LOW LEAD EXPOSURE ON THE LEVEL OF DELTA-AMINOLEVULINIC ACID DEHYDRATASE ACTIVITY. *Arhiv Hig. Rada Toksikol (Yugoslavia), 21(3):241-246, 1970. 18 refs.*

Urinary lead, coproporphyrin (CP), and delta-aminolevulinic acid (ALA) levels were measured in 99 typographers with slight exposure to lead. Parallel blood ALA-dehydratase (ALA-D) activity measurements were taken. A statistically significant difference (t equals 3.77; P less than 0.001) in ALA-D activity was obtained between the 99 exposed workers and 33 control subjects. The mean value of enzyme activity in the exposed group was 77% of that of the control group. About 60% of the lead workers had ALA-D activity below 80 units/ml of RBC. In spite of the marked reduction of enzyme activity, mean urinary lead, ALA, and CP values for the exposed group were within normal limits. As a test for lead exposure, ALA-D activity determination may be too sensitive for use in industrial medicine, especially in control of workers with evident lead exposure.

19124 APTIC NO. 36936

Neumann, Hans H.

PICA--SYMPTOM OR VESTIGIAL INSTINCT? Pediatrics, 46(3):441-444, Sept. 1970. 10 refs.

Pica is found commonly in the United States, and universally found in West Africa. From observations in West Africa, pica -- particularly the chewing of pieces of wood -- appears to be the expression of an instinctual need for something hard to chew on. This may favor the development and maintenance of sound primary and secondary dentitions. Excellent, decay-resistant teeth prevail wherever indulgence in this type of pica is permitted. In advanced societies the urge to chew on hard non-edible materials is provisionally sanctioned during the time of teething. The need for it seems to extend over years rather than over the few weeks during which it is tolerated. As the instinctual urge becomes vestigial or suppressed, other functionall inadequate materials may be employed by children. The view that pica in children is generally an expression of personality disturbance seems questionable. (Author abstract)

19125 APTIC NO. 37504

Oshima, Hidehiko, Masayuki Imai, and Fukiko Kawagishi

AIR POLLUTION AND MORTALITY IN YOKKAICHI DISTRICT. *(Yokkaichi chiiki ni okeru taiki osen to shiboritsu ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):424, 1971.*

Deaths in Yokkaichi District from 1961 to 1969 were classified according to death certificates by year, area, cause, age, and sex; comparison between polluted and non-polluted areas and the correlation with air pollution were investigated. In the polluted area compared to the non-polluted areas, the mortality due to malignant neoplasm tended to be high; the mortality due to damage on blood vessels of the central nervous system tended to be low. In mortalities due to total heart diseases, total tubercular diseases, and pneumonia, the difference between both areas was not clear. While the mortality due to bronchial asthma decreased year after year since about 1966 in the non-polluted area, it tended to increase year after year in the polluted area; on the average in 1967 and 1968, a significant difference at 5% risk was evident. The correlation between mortality due to obstructive respiratory diseases and sulfur dioxide from 1967 to 1969 was significant at a risk of 5%.

19126 APTIC NO. 37420

Patterson, K.

CONTAMINATION OF THE ENVIRONMENT WITH LEAD. *(Zagryaznenie vneshney sredy svintsom). Text in Russian. Gigiena i Sanit., 36(11):89-94, Nov. 1971. 16 refs.*

Historic and recent problems of environmental contamination with industrial lead as well as criticism of the way related issues are handled in the U. S. are outlined. About 95% of the lead entering the organism with food is discharged with feces, and 40% of the lead inhaled can be detected in the blood. In highly industrialized countries, foodstuffs contain about 0.2 ppm of lead. Increasing contamination of the biosphere can be observed. The world s lead production amounted to 3,500,000 tons in 1966, and a total of 430,000 tons are discharged into the seas yearly. The geochemical balance of several areas is disturbed by massive lead contaminations. Lead concentrations 100 times the normal value were measured over the Pacific, and levels 10,000 times the normal value were found in city air. Arctic snow contains lead 500 times the normal content. Increased lead content was revealed in soils, too. A total of 310,000 tons of lead was consumed by the chemical industry and as fuel additive in 1966. Americans incorporate, on a daily average, 350 and 20-50 micrograms of lead with food and water, and from air respectively. Their bodies contain about 200 mg of lead, with an average concentration of 0.25 ppm in the blood. Norms for lead contamination should be based on lead concentrations in blood. The natural lead level of the blood lies at 0.01 ppm, 0.8 ppm representing classic lead poisoning. After a long-lasting fight between health care and business interests, the medical aspects are becoming more important in the U.S.A.

19127 APTIC NO. 37440

Pavlenko, S. M.

CERTAIN COMMON TRAITS IN THE ACTION OF INDUSTRIAL NONELECTROLYTE POISONS ENTERING THE BODY SIMULTANEOUSLY WITH THE WATER AND AIR. *(K voprosu o nekotorykh zakonomernostyakh leystviya promyshlennykk yadov-neelektrolitov, postupayushchikh v organizm odnovremenno s vodoy i vozdukhom). Text in Russian. Gigiena i Sanit., 37(1):40-45, 1972. 7 refs.*

This paper contains a theoretical substantiation of the regularity of the complex action of industrial nonelectrolyte poisons. Four substances (ethyl and methyl alcohols, cyclohexanone, and benzene are considered. The experimental data presented make it possible to trace the regularity in body reactions to a long term joint entry into the body of noxious nonelectrolyte substances in small concentrations and doses. As a rule, the effect produced is the sum of effects of all substances present.

19128 APTIC NO. 36964

Pentschew, Angel

MORPHOLOGY AND MORPHOGENESIS OF LEAD ENCEPHALOPATHY. *Acta Neuropathol., 5(2):133-160, 1965. 47 refs.*

Twenty infantile cases of lead encephalopathy stimulated a reappraisal of its morphology and morphogenesis in the light of current better comprehension of the principles regulating the blood flow in the brain and the recent progress of the biochemistry of lead poisoning. The underlying cause of lead encephalopathy is most probably a toxic disorder of porphyrin synthesis. It brings about a deficit of an unknown factor participating the energy metabolism. In contrast to the other encephalopathies, the hemodynamics of the brain is impeded in addition to dysoria. The reason is that in lead poisoning the integrative homeostatic system which encompasses the autoregulation of the cerebral hemodynamics and the ability of shunting blood from less vital areas to the brain is also affected. The metabolic hypoxidosis of the brain in saturnism is tolerated until additional stresses upset the labile balance between energy supply and energy demand. The acute exacerbation is brought about by increase in the lead content of the serum, further damaging the precarious porphyrin metabolism, or by disorders of the systemic circulation that might otherwise be insignificant but amount to the effect of a temporary cardiac failure on the brain already in a state of allobiosis. Inflammatory changes ranging from perivascular cuffings to granuloma formation give the lead encephalopathy its special physiognomy. The brunt of the damage in lead encephalopathy is borne by the cerebellar cortex, more specifically by its molecular layer. (Author summary modified)

19129 APTIC NO. 36923

Plotnikova, M. M.

BASIC INVESTIGATIONS FOR THE DETERMINATION OF THE LIMIT OF ALLOWABLE ACROLEIN CONCENTRATION IN ATMOSPHERIC AIR. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. V. A. Ryazanov (ed.), Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 59-72. 10 refs. (Translated by B. S. Levine.)*

NTIS: TT61-11148

Threshold levels of acrolein perception were determined to help in setting maximum allowable limits of concentration. The threshold level of its odor perception was 0.8 mg/cu m for most sensitive persons. The thresholds of acrolein reflex effect on optical chronaxy was at 1.75 mg/cu m, on rhythm and amplitude of respiratory movement at 1.5 mg/cu m, and on eye sensitivity to light at 0.6 mg/cu m. Based on these data, the proposal for maximum allowable concentration in the ambient air was set at 0.3 mg/cu m. The present level established for working areas (two mg/cu m) caused irritation of the conjunctive and nasal mucosa, lowered eye sensitivity to light, and elicited changes in the rhythm and amplitude of respiratory movements. Air quality measurements in the area around oil drying plants determined concentrations of acrolein in excess of the allowable limits even at 1000 m from the plant. (Author conclusions modified)

19130 APTIC NO. 37417

Potkonjak, Velimir

THE STUDY OF THE UNIFORMITY OF ALVEOLAR VENTILATION. *(Inspitivanje uniformonosti alveolne ventilacije). Text in Serbo-Croatian. Pucne Bolesti, 23(1):133-146, Jan.-March 1971. 14 refs.*

Alveolar ventilation may be viewed either as a stage of intrapulmonary ventilation in which the gas phase is distributed throughout the lungs, or as the alveolo-capillary gas exchange including the process of contamination of arterial blood by various local ventilations. Uniformity of alveolar ventilation denotes the condition in which, in the course of the same inhalation, the alveoli are simultaneously and equally supplied with adequate amounts of fresh air. In nonuniform ventilation, in the course of the same inhalation, some alveoli receive an adequate amount, while others receive but a fraction of it, or none at all. Causes of nonuniformity, the significance of anatomical dead space and of physiological dead space, and perfusion are discussed in considerable detail. The effects of nonuniform ventilation and of nonuniform pulmonary capillary blood flow on the gases contained in blood are reviewed. The diagnostic significance of tests of alveolar ventilation in particular, for an assessment of the working capacity of lungs is explained. Several types of tests of alveolar ventilation are evaluated with respect to their advantages and drawbacks. Some data showing correlations among results of different types of tests of ventilation, as well as their reproducibility are given.

19131 APTIC NO. 37685

Pott, F. and A. Brockhaus

COMPARISON OF THE ENTERAL AND PULMONARY ABSORPTION RATES OF LEAD COMPOUNDS. *(Vergleich der enteralen und pulmonalen Resorptionsquote von bleiverbindungen). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, vol. 155:1-17, 1971. 16 refs.*

The rates of enteral and pulmonary absorption of lead were examined in rats. Two lead compounds of different solubility (lead bromide and lead oxide) were administered orally or intratracheally at various dosages. Corresponding groups of animals received the lead intravenously to obtain models of a 100% rate of absorption. The content of lead in the femora, which was relatively constant at 6.8% was regarded as representative of the entire bone tissue. Following intratracheal injection of lead, the same amounts of lead were collected in the femoral bone tissue as following intravenous injection. Following oral administration, however, no more than 5% was determined. The content of lead in the air, therefore, is biologically more important than lead in food.

19132 APTIC NO. 37012

Racoveanu, Carmen, V. Nicolaescu, M. Manicatide, N. Raiciulescu, Ileana Dragulescu, and Cornelia Olaru

EPIDEMIOLOGIC INVESTIGATIONS IN CHRONIC BRONCHITIS. *(Cercetari epidemiologice in bronsita cronica). Text in Rumanian. Stud. Cercet, Med. Interna, 11(3):219-224, 1970. 16 refs.*

The incidence of chronic bronchitis as related to smoking and the degree of bronchial reactivity to acetylcholine were investigated for three separate groups of people living in areas with different climates and degrees of air pollution. Based on standard questionnaires, clinical examinations, and respiratory function tests, the frequency of bronchitis was correlated with the incidence of smoking and bronchial reactivity. Incidence of bronchitis was maximum in Bucharest (16.4%), low in a village in the Danube delta (5.7%), and relatively high in a mountain village (10.8%). Intensity of smoking and degree of bronchial reactivity were not significantly correlated.

19133 APTIC NO. 36935

Roe, F. J. C., E. Boyland, C. E. Dukes, and B. C. V. Mitchley

FAILURE OF TESTOSTERONE OR XANTHOPTERIN TO INFLUENCE THE INDUCTION OF RENAL NEOPLASMS BY LEAD IN RATS. *Brit. J. Cancer (London), vol. 19:860-866, 1965. 13 refs.*

An investigation was undertaken to determine whether the administration of testosterone or of xanthopterin to rats would influence renal carcinogenesis by lead. Three groups of 24 male CB Wistar rats were injected with lead phosphate repeatedly over a period of 34 weeks. The first group received a total dose of 450 mg per rat; the second group, 145 mg per rat; and the third, 29 mg per rat. More than half the rats in the first two groups which survived for more than 200 days developed benign or malignant kidney tumors. No renal tumors developed in the third group. Repeated injections of testosterone propionate or xanthopterin failed to influence the induction of renal tumors by lead. Primary neoplasms of sites other than the kidney arose in approximately equal frequency in all groups. (Author summary modified)

19134 APTIC NO. 37360

Roehm, Jeffery N., John G. Hadley, and Daniel B. Menzel

OXIDATION OF UNSATURATED FATTY ACIDS BY OZONE AND NITROGEN DIOXIDE. *Arch. Environ. Health, 23(2):142-148, Aug. 1971. 15 refs.*

Trace quantities of ozone and nitrogen dioxide, 1.5 ppm catalyzed the rapid oxidation of unsaturated fatty acids. Nitrogen dioxide catalyzed oxidations were dependent upon the nitrogen dioxide concentration in the atmosphere. Both thin films and aqueous emulsions of fatty acids are oxidized by nitrogen dioxide through a mechanism akin to the spontaneous autoxidation in air. Phenolic antioxidants, including vitamin E, retarded the oxidation. Ozone catalyzed a more rapid and complete oxidation than nitrogen dioxide by a direct attack upon the double bonds of the fatty acid. Phenolic antioxidants are protective only in aqueous emulsions where the oxidation process proceeds by peroxidation as well. Oxidation of essential tissue polyunsaturated fatty acids by ozone and nitrogen dioxide is a likely common mechanism of toxicity. Therefore, animals exposed to ozone or NO2 will experience oxidation of lipids.

19135 APTIC NO. 37139

Sadilowa, M. S. and L. N. Jelnitschnych

EXPERIMENTAL TOXICOLOGIC VALUES FOR THE HYGIENIC ASSESSMENT OF LOW CONCENTRATIONS OF INORGANIC FLUORINE COMPOUNDS IN THE AIR. *(Toxikologische Experimentalwerte zur hygienischen Einschaetzung geringer Konzentration anorganischer Fluorverbindungen in der Luft). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 13(10):741-745, 1967. 3 refs.*

The toxicity of fluorine compounds was investigated to determine maximum allowable concentrations. The severity of the toxic effects of different fluorine compounds depends on the concentration and solubility in the biological media. For biological aggressiveness, fluorine gases rank first, followed closely by fluorides, and then by hardly soluble fluorine salts. Unique and daily average maximum allowable concentrations were, therefore, established, respectively, at 0.02 and 0.005 mg/cu m for gaseous fluorine compounds, 0.03 and 0.01 mg/cu m for fluorides, and 0.2 and 0.03 mg/cu m for the hardly soluble salts.

19136 APTIC NO. 37660

Saito, Yozo

AEROBIOLOGICAL AND CLINICAL STUDIES ON ALLERGENIC POLLENS IN TOKYO AREA. *Bull. Tokyo Med. Dental. Univ., 18(2):95-104, 1971. 20 refs.*

Pollen surveys in Meguro, Tokyo, carried out by the gravity-slide method from 1965-1967, confirmed the presence of allergenic pollens. In this area, the pollinating period of the airborne pollen began in late January and ended in November. There were three pollen seasons. The tree pollen season was observed from February to May, the grass pollen season from May to October, and the ragweed pollen season from August to September. The prevalent pollens were the Japanese, the Japanese pine, and short ragweed. Intradermal tests with four commerical pollen extracts and a control were performed on 129 patients with nasal allergy. The rate of positive skin reactivity to individual pollen allergens was: short ragweed 33.3%; Japanese hop 12.4%; Japanese red pine 10.8%; and Japanese cedar 10.1%. The combined aerobiological and clinical data suggest that in the Tokyo area there are significant hay fever plants and positive skin reactors.

19137 APTIC NO. 37119

Sayers, R. R., A. C. Fieldner, W. P. Yant, and B. G. H. Thomas

EXPERIMENTAL STUDIES ON THE EFFECT OF ETHYL GASOLINE AND ITS COMBUSTION PRODUCTS. *Bureau of Mines, Washington D. C., 447p., 1927. 65 refs.*

The problem of making a marketable anti-knock material was not solved until the discovery was made that tetraethyl lead, a liquid soluble in gasoline, effectively suppressed detonation or knock, when present to the extent of one part in 1270 of gasoline -- which is less than 0.08%. The only apparent drawback to the general use of this new anti-knock compound was the possible hazard to public health from the lead in the gasoline and its combustion products. Lead poisoning in general is discussed. An investigation was undertaken to determine the physiological effect of inhaling air contaminated with automobile exhaust gases. Monkeys, dogs, rabbits, guinea pigs, and pigeons were exposed to ethyl gasoline exhaust gases. Storage of lead in the tissues, pathology, weight, hematology, and symptoms were considered. Several tests were also made on men. An investigation was also undertaken to determine the effect of ethyl gasoline when applied to the skin. Certain quantities of 1.0, 0.5, 0.25, and 0.1 cc of ethyl gasoline, gasoline, benzol gasoline blend, benzol, and benezene were applied to monkeys, a dog, rabbits, guinea pigs, and rats. Pathological, hematological, and weight and growth observations were made. Symptoms were also indicated. Unburned gasoline vapors were also inhaled by the test animals. Exposure and test methods are discussed.

19138 APTIC NO. 37753

Sidorenko, G. I. and M. A. Pinigin

ON THE METHODS OF INVESTIGATING THE PERMISSIBLE CONCENTRATIONS OF ATMOSPHERIC POLLUTIONS. *(K metodike obosnovaniya predelno dopustimykh kontsentratsiy atmosfernykh zagryazneniy). Text in Russian. Gigiena i Sanit., 36(11):99-100, Nov. 1971. 11 refs.*

Methodical problems of establishing different standards for maximum allowable concentrations are outlined. The ratio of the maximum allowable singular to the maximum allowable 24-hour average concentration lies at 1:10. In the experimental determination of standards, the principle of limitation factors should be used. If the threshold and maximum ineffective concentration calculated from the reflector effect exceeds the respective values for the resorptive effect, then the maximum allowable singular concentration only should be specified. If the threshold and the maximum allowable ineffective concentrations are equal for both reflector and resorptive effects, then separate norms are required for maximum allowable single and 24-hour concentrations. Examinations of the effects of chemical substances on the bioelectric activity of the cortex show that maximum ineffective concentrations are below the threshold. A safety coefficient should be introduced for maximum allowable singular concentrations. For two or more pollutants present jointly, the joint effects should be considered instead of a mere summation. The chronic experimental determination of the maximum allowable 24-hour mean concentration extends over 45-150 days. The test animals should be exposed for all their lives, as man is to atmospheric pollution. Due to the periodicity and fluctuations in air pollution, intermittent effects should be investigated. For toxic materials, the general evolution of the toxic effect should be given major emphasis. Highly differentiated norms are required to prevent resorptive effects of air pollution.

19139 APTIC NO. 37010

Smith, Josef R.

ANATOMY AND PHYSIOLOGY OF THE RESPIRATORY SYSTEM. *Society of Automotive Engineers, Inc., New York, Med. Aspects Air Pollut., Detroit, Mich., 1971, p. 1-9. (Jan. 14, Paper 710297.)*

The human respiratory system is discussed in terms of its function and factors involved in its control of respiration, mechanics of breathing, flow pressure relationships, and gas transfer. The respiratory system is analogous to an energy-producing machine that burns carbon and hydrogen. The product of hydrogen oxidation, water, makes up about 80% of the body, and fairly generous fluctuations in water content are well tolerated by the body. But the oxygen for this combustion process and the carbon dioxide produced must be closely regulated if the individual is to continue to function. The respiratory system is responsible for supplying the needs for 02 uptake and CO2 excretion. An average 150-lb man will utilize about 225 ml 02/min at rest and produce slightly less C02. With severe exercise, the body may require almost a 20-fold increase in 02 uptake and CO2 excretion. From the standpoint of design and the limitations of space and efficiency, the respiratory system is remarkable. But a price is paid for this compactness and duel function in that when one component fails, the whole system is likely to fail.

19140 APTIC NO. 37040

Smith, Ralph G.

HEALTH ASPECTS OF ATMOSPHERIC EXPOSURE TO LEAD. *Society of Automotive Engineers, Inc., New York, Med. Aspects Air Pollut., Detroit, Mich., 1971, p. 53-66. 21 refs. (Jan. 14, Paper 710302.)*

An extensive survey of lead levels conducted in 1962 in Cincinnati, Philadelphia, and Los Angeles showed an annual average concentration of lead in the atmosphere ranging from about 2 micrograms/cu m air in the downtown and industrial area of Cincinnati, to about 1 in the outlying areas of that city. The values in corresponding areas in Philadelphia ranged from 3 to 1, and in Los Angeles from 3 to 2. Air levels of lead are directly proportional to the amount of traffic in the area where measurements are made. Physical and chemical characteristics of lead aerosol are described. The importance of dietary lead intake is discussed, as well as the body burden of lead. One study indicated that the median body burden of lead for the so-called standard man was 121 mg, with a value range from 10-435 mg. Blood and urine levels of lead are discussed as indices of lead intake and in relation to occupational plumbism. Methods of analysis of biological samples for lead are presented. Lead interferes with the normal process of maturing red cells, and the presence of immature forms of red cells, in particular so-called stippled or basophilic cells, has been used in the past as a diagnostic aid. Lead also interferes with the formation of certain substances which are the precursors of the heme in hemoglobin. The action of lead results in excessive production of coproporphyrin III, while lead also inhibits the enzyme which converts delta-aminolevulinic acid to porphobilinogen.

19141 APTIC NO. 37282

Steinegger, S.

HISTOLOGY OF CHIZZOLA MUCULAE. *Fluoride, 5(1):14-17, Jan. 1972. 4 refs.*

In recent years, skin lesions resembling traumatic suffusions have occurred in epidemic proportion in two Italian cities located near aluminum and other fluoride-emitting factories: Chizzola and Bolzano. Morphologically, the lesions are round or oval in shape. They have reddish-brown color when they originate but change to a bluish-brown prior to their disappearance. As determined by skin biopsies on three children with characteristic maculae, pericapillar lymphocytic infiltration and proliferation of endothelial cells of capillaries are the principle pathological features of the lesions. These features suggest a toxic inflammatory process.

19142 APTIC NO. 37081

Stone, Herbert

INFLUENCE OF TEMPERATURE ON OLFACTORY SENSITIVITY. *J. Appl. Physiol., 18(4):746-751, July 1963. 21 refs.*

The olfactory response to acetic acid was studied at six experimental temperatures (12.5, 15, 20, 25, 30, and 35 C) for a trained panel of 10 subjects. Determination of the 50% thresholds indicated no significant differences in olfactory sensitivity at the various environmental temperatures. Further analysis of the data indicated two significantly different groups of differing absolute sensitivity; however, no influence of temperature on olfactory sensitivity was noted. The 50% threshold for acetic acid was 0.0039 mg/l air for the pooled data. Temperature recordings of inhaled and exhaled air in the nasal cavity suggested inspired air was rapidly equilibrated with body temperature by heat provided by the conchae. The inspired air stream is rapidly warmed to body temperature and any apparent changes in olfactory sensitivity would appear to be physical phenomena and not response to a true olfactory stimulus. (Author abstract modified)

19143 APTIC NO. 37354

Sturgis, Katharine Boucot

INTRODUCTION TO THE SYMPOSIUM ON ATMOSPHERIC POLLUTION: ITS LONG TERM IMPLICATIONS. *Proc. Am. Phil. Soc., 114(1):1-2, Feb. 1970.*

While man is amazingly capable of adjustment, he is currently subjecting himself voluntarily to environmental changes so rapid that his survival is threatened. He may be unable metabolically, physiologically, phychologically, socially, and even genetically to achieve the tolerances demanded of him by urbanization and environmental pollution. Pollution episodes in the Meuse Valley and Donora are cited, as well as the acute smogs and inversions in London. Besides acute community exposures, adverse health effects of air pollution may be gauged from industrial exposure, epidemiologic studies, and experimental research, both animal and human. The impact of inhaled pollutants is not limited to the lungs. Through absorption into the blood and by swallowing, the effects are extended to the heart, blood vessels, and to other organs.

19144 APTIC NO. 36924

Takhirov, M. T.

BASIC PRINCIPLES FOR THE DETERMINATION OF ALLOWABLE CHLORINE CONCENTRATION IN THE ATMOSPHERE OF INHABITED LOCALITIES. *In: Limits of Allowable Concentrations of Atmospheric Pollutants. V. A. Ryazanov (ed.), Book 4, Washington, D. C., U. S. Dept. of Commerce, 1960, p. 31-49. 13 refs. (Translated by B. S. Levine.)*

NTIS: TT61-11148

The atmosphere in the neighborhood of a chemical processing plant and the city of Moscow was monitored for concentrations of chlorine to help in determining maximum allowable concentrations for inhabited areas. The air of the plant was continuously polluted with chlorine and the air of the city contained a continuous supply of free chlorine even at comparatively great distances from the source of discharge. Chlorine was correlated with meteorological variables. The effect of chlorine on human health was investigated. The threshold of chlorine odor perception for sensitive persons was 0.5 mg/cu m. The threshold of chlorine effect on reflex activity as determined by changes in eye sensitivity to light was identical. Thresholds as determined by respiration and optical chronaxy were 1.5 mg/cu m. The maximum allowable concentration adopted by the USSR was 0.1 mg/cu m, a value considerably below the established thresholds. (Author conclusions modified)

19145 APTIC NO. 37658

Thomas, R. G.

ESTIMATION OF PARTICLE SIZE DISTRIBUTION PARAMETERS IN ANIMAL LUNGS. *Aerosol Sci., 2(4):393-400, Dec. 1971. 15 refs.*

A constant of specific solubility of 2.5 times 10 to the minus eighth power g/sq cm/day was determined for fused aluminosilicate particles, by observing in vivo retention kinetics after intravenous injection into rats. Retention half-lives in the lung of 460 and 285 days, respectively, were found in dogs and rats which inhaled labeled aerosols of these particles. By applying these values for solubility and half-life to Mercer's theory of dissolution from the deep lung, the initial distribution of particles deposited in the pulmonary regions of dogs and rats following inhalation was calculated. Describing the particle distribution in the lung has some interesting ramifications pertaining to toxicological problems, particularly where particle concentration and number are important. (Author abstract modified)

19146 APTIC NO. 37133

Torkelson, T. R. and V. K. Rowe

RESULTS OF REPEATED INHALATION BY LABORATORY ANIMALS AND A LIMITED HUMAN SENSORY STUDY OF A MIXTURE OF SATURATED AND UNSATURATED C3 AND C4 HYDROCARBONS (MAPP INDUSTRIAL GAS). *J. Am Ind. Hyg. Assoc., 25(4):554-559, Nov.-Dec. 1964. 10 refs.*

Rats, guinea pigs, rabbits, and dogs were exposed seven hours per day, five days per week for 16 weeks to either 5000 or 1000 ppm of a mixture of saturated and unsaturated C3 and C4 hydrocarbons. There were no adverse effects on either sex of any of the species exposed to 1000 ppm as determined by growth, mortality, body and organ weights, clinical and biochemical determinations, urinalysis, hematological examination, and gross and microscopic pathological examination. Questionable and presumably reversible changes were seen only in male rats and guinea pigs exposed to 5000 ppm. Results of the limited sensory perception study on humans indicated that some persons could detect 25 ppm and most would detect 100 ppm. The odor was found to be strong at 1000 ppm and quite objectionable at higher concentrations. (Author abstract)

19147 APTIC NO. 37329

Tsuchiya, Yoshio and Kikuo Sumi

EVALUATION OF THE TOXICITY OF COMBUSTION PRODUCTS. *J. Fire Flammability, vol. 3:46-50, Jan. 1972. 4 refs.*

The potential danger of toxic combustion products may be increasing because of the increasing use of new materials, especially synthetic polymers, both as building materials and in goods and furnishings that make up the contents of buildings. For the purpose of evaluating and comparing the potential danger from toxic gases produced by the combustion of materials, a maximum toxicity index is proposed. The maximum toxicity index of a material is calculated from experimental data on the quantity of toxic combustion products and the lethal concentration of the products. The potential hazard of the toxic combustion products of wood is compared with that of polyvinyl chloride. (Author abstract modified)

19148 APTIC NO. 37505

Tsunetoshi, Yoshizo, Tadahiko Shimizu, Ryuichiro, Suzuki, Miyoko Ueda, Noriko Nakayama, Yasuyo Yamagata, Katsumi Yoshida, Hidehiko Oshima, Masayuki Imai, Toru Yoshida, Motoaki Adachi, Fumihiko Akai, and Katsuhiko Tsujioka

EFFECT OF AIR POLLUTION TO SCHOOL CHILDREN. PART I. *(Taiki osen no gakudo ni taisuru eikyo. (Dai 1 po)). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 18(10):420, 1971.*

The effects of smoke and dust were investigated for five years since 1965 with respect to school children in Chiba, Mie, and Osaka (nine schools with a total number of children of 23,048) and the data were examined. Respiratory function tests with children of non-polluted schools (average value of sulfur dioxide) measured by the lead dioxide method from January 1964 through April 1968 was below 0.3 mg/day/100 sq cm) in each prefecture were determined for forced vital capacity (Y) measured by Vitalor as indicated by the following formula where body height is expressed as X and age as Z: Y equals (0.44 + 3.01Z)X 345.22Z + 1379.88 in boys, and Y equals (0.44 + 3.01Z)X 345.33Z + 1244.12 in girls. The difference between the values obtained from the above calculation and actual measurements was within the range of observational errors both in boys and girls. It was found that 1, 0.75, and 0.5 second rates decreased with the increase of height in all grades and both sexes. Mean values of SO2 measured by PbO2 method as an index of pollution were divided into four groups such as 1.0, 0.5 0.9, 0.1 - 0.4 and below 0.1 mg/day/100 sq cm. As a result of calculation in each group, the difference between actual and expected values of forced vital capacity became larger and the frequency of values below the expected one increased with an increase of pollution level. The difference of mean values of timed vital capacity corrected for height between polluted and non-polluted schools became larger with an increase of pollution in the case of pollution level over 0.1 mg/day/100 sq cm.

19149 APTIC NO. 37759

Weisz, H.

A METHOD FOR THE DETERMINATION OF BENZO(A)PYRENE IN HUMAN LUNGS. *(Eine Methode zum Nachweis und zur Bestimmung von 3,4-Benzpyren in Menschenlungen). Text in German. (Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, vol. 155:78-86, 1971. 8 refs.*

A method for the identification and quantitative estimation of 100 ng of benzo(3,4)pyrene (Benzo(a)pyrene) in human lungs is described. The lung tissue is first saponified by warm, alkaline hydrolysis. The water-soluble substances are thus separated from insoluble substances such as hydrocarbons, styrenes, and fatty alcohols. The solution resulting from the complete disintegration of the lung tissue is reddish brown and becomes transparent upon the addition of water. Since dust and, in some cases, calcium phosphate, is only partially sedimented during this procedure, the solution is centrifuged to obtain complete sedimentation. The polycyclic aromatic hydrocarbons are extracted with dichlormethane, a perforator being used for the extraction from the supernatant and a soxhlet for the extraction from the sedimented dust. The polycyclic aromatic hydrocarbons extracted from the supernatant are separated first by column chromatograpy and then by two-dimensional thin layer chromatography; the extract from the dust is immediately subjected to thin layer chromatography. The quantification of benzo(3,4)pyrene is by fluorescence measurement in a spectrophotometer. With allowance for a 60% loss due to the analytical procedure, the minimum amount of benzo(a)pyrene detectable in one lung is 200-400 ng.

19150 APTIC NO. 37130

Winkelstein, Warren, Jr. and Seymour Kantor

STOMACH CANCER: POSITIVE ASSOCIATION WITH SUSPENDED PARTICULATE AIR POLLUTION. *Arch. Environ. Health, vol. 18:544-547, April 1969. 11 refs. (Presented at the American Medical Association Air Pollution Medical Research Conf., 9th, Denver, Colo., July 22, 1968.)*

A study in the Buffalo, New York, area based on census data and a two-year program of air sampling demonstrated a positive association between suspended particulate pollution and death rates from gastric cancer in white men and women, 50-

69 years of age. The mortality rates for gastric cancer in this age group were almost twice as high in areas of high suspended particulate pollution as in areas of low pollution. The association appears to be independent of the effect of economic status and not attributable to the distribution of ethnic populations with higher-than-expected mortality from stomach cancer. (Author summary modified)

19151 APTIC NO. 36934

Zook, B. C., J. L. Carpenter, and E. B. Leeds

LEAD POISONING IN DOGS. *J. Am. Vet. Med. Assoc., 155(8)1329-1342, Oct. 15, 1969. 40 refs.*

Lead poisoning was diagnosed and studied in 60 dogs. Lead poisoning is a common disease of young dogs, especially in the summer and fall, and is related to their chewing and eating habits resulting in the ingestion of paint, linoleum, or other lead-containing materials. The signs were characterized by gastrointestinal dysfunction and nervous disorders. Blood findings consisted of numerous stippled and immature erythrocytes in the absence of severe anemia. Protein and casts were frequently found in the urine. Radiography sometimes revealed lead-containing particles in the gastrointestinal tract, and lead lines were occasionally detected in the metaphysis of long bones in immature dogs. Treatment with calcium ethylenediaminetetraacetic acid resulted in rapid and often dramatic recoveries in nearly all instances. (Author summary modified)

EFFECTS-PLANTS AND LIVESTOCK

19152 APTIC NO. 36991

Anderson, William L. and Peggy L. Stewart

RELATIONSHIPS BETWEEN INORGANIC IONS AND THE DISTRIBUTION OF PHEASANTS IN ILLINOIS. *J. Wildl. Manage., 33(2):254-270, April 1969. 25 refs.*

The relationships between inorganic ions and the distribution of ring-necked pheasants in Illinois were investigated by comparing concentrations of 24 elements in soil, grit, corn, and tissues of pheasants collected from good (Sibley), fair (Humboldt), and poor (Neoga) pheasant range. Concentrations in soil and in grit indicated that calcium, iron, and nickel, and perhaps magnesium and potassium, were potentially less abundant in diets of Neoga pheasants than in those of Sibley birds. Conversely, lead, manganese, strontium, and zinc, and perhaps cadmium, chromium, copper, molybdenum, and vanadium, were potentially more abundant in diets at Neoga than at Sibley. Elemental concentrations in soil and in grit from Humboldt were, for the most part, intermediate between concentrations in these materials at Sibley and Neoga. Concentrations of major elements (Ca, Mg, K, phosphorus, and sodium) in internal organs were from 12-34% lower in Neoga pheasants, and from 4-20% lower in Humboldt pheasants, than in birds from Sibley. Three trace elements (barium, Mn, and titanium) were less than half as abundant, and five (Cr, Pb, Ni, V, and zirconium) at least twice as abundant, in blood, livers, or kidneys from Neoga pheasants as in these tissues from Sibley birds. Concentrations of cobalt and Mo in blood, livers, and kidneys of Neoga and Sibley pheasants exhibited conflicting area-to-area differences. Of the elements studied, suspicion is directed toward Ca, Mg, K, Cr, Co, and Mo as possibly influencing the distribution of pheasants in Illinois. (Author abstract modified)

19153 APTIC NO. 37125

Berge, Helmut

PHYTO-HYGIENE AND POLLUTANT RESISTANT PLANT BREEDING FOR THE PROTECTION AND CULTIVATION OF PLANTS IN POLLUTED AREAS. *(Pflanzenhygiene und Resistenzzuechtung als Pflanzenschutz- und Kulturmethoden in Immissionsgebieten). Text in German. Angew. Botan., 41(5):176-180, 1967. 9 refs. (Presented at the 6th International Meeting on Plant Protection, Vienna, Austria, Aug. 8-Sept. 6, 1967.)*

Plant hygiene is essential when intended for human or animal consumption and cultivated in polluted areas. Breeding of pollutant resistant plants becomes essential when their use for technological purposes is intended. The feasibility of these goals is illustrated by certain woody species grown in environments with up to 50 mg/cu m phenol. Plant resistance properties can be influenced by biological, chemical or physical procedures. However, the climatic, orographic, edaphic and biotic conditions must be taken into account.

19154 APTIC NO. 37268

Brennan, Eileen and Ida A. Leone

CHRYSANTHEMUM RESPONSE TO SULFUR DIOXIDE AND OZONE. *Plant Disease Reptr., 56(1):85-87, Jan. 1972. 3 refs.*

Sixteen varieties of rooted chrysanthemum cuttings were exposed to concentrations of sulfur dioxide or ozone that might occur in highly polluted ambient air. None of the varieties was particularly sensitive to either SO2 or 03. At 4.5 ppm SO2 for 4 hr, only five varieties were even slightly damaged; at 0.30 ppm 03 for 3 hr, only two varieties were slightly damaged. By comparison, at these concentrations zinnia, geranium, and pinto bean would be injured by SO2 and tobacco, tomato, pinto bean, squash, and cucumber would be injured by 03. (Author abstract modified)

19155 APTIC NO. 37105

Cook, R. M. and K. A. Wilson

REMOVAL OF PESTICIDE RESIDUES FROM DAIRY CATTLE. *J. Dairy Sci., 54(5):712-718, May 1971. 38 refs.*

In an effort to intentionally increase the elimination of chlorinated hydrocarbon pesticides from cattle, several compounds were fed to animals contaminated with heptachlor, dieldrin, or DDT: mineral oil, animal and vegetable fat, calcium salts, bentonite, ethoxyquin, thyroprotein, and vitamins A, D, and E. In addition, the effects of high energy or low energy rations on pesticide excretion were studied. Some of these materials helped to remove pesticides but the effects were not dramatic. The method that is effective as an antidote for pesticide poisoning in cattle is a combination of activated carbon and phenobarbitol feeding. This method proved successful in a large scale field trial involving 105 lactating Holstein cows that had been contaminated with aldrin. A review of recent research is included. (Author abstract modified)

19156 APTIC NO. 37530

Curtis, C. R. and R. K. Howell

INCREASES IN PEROXIDASE ISOENZYME ACTIVITY IN BEAN LEAVES EXPOSED TO LOW DOSES OF OZONE. *Phytopathology, 61(10):1306-1307, Oct. 1971. 13 refs.*

Polyacrylamide gel electrophoresis of Tempo bean leaf proteins, extracted from plants grown in filtered air, revealed that low doses of ozone (20-25 pphm for 90-180 min) increased the activity of many peroxidase isoenzymes. Symptomless leaves previously exposed to ozone showed a similar increase in activity, but not as much as in leaves exhibiting definite symptoms of ozone injury. (Author abstract)

19157 APTIC NO. 37346

Daessler, H. G.

THE EFFECT OF HYDROGEN FLUORIDE AND CRYOLITE DUST UPON PLANTS AND ANIMALS NEAR A HYDROGEN FLUORIDE FACTORY. *Fluoride, 4(1):21-24, Jan. 1971. 3 refs. (Presented at the International Society of Fluoride Research Conference, 3rd Annual, Vienna, Austria, March 22-25, 1970.)*

To clarify damage due to fumigation by hydrogen fluoride and cryolite (sodium aluminum fluoride) dust, studies were carried out on fruit trees, agricultural plants, vegetables, and ornamental plants in the vicinity of a hydrofluoric acid factory. The development of toxic symptoms, differences in sensitivity between plant species, and extent of leaf and fruit damage are described. Plants resistant to F(-) pollution were sour cherries, raps, sugar beets, potatoes, cabbage, asters, and roses. In fruit trees, the sensitivity of leaves did not parallel that of fruit. Fumigation experiments with HF in air mixtures produced results that agreed closely with the field observations. Fluoride intoxication in milk cows near the factory was manifested by reduced milk production. The bee population suffered substantially from F(-) emissions. (Author abstract modified)

19158 APTIC NO. 36975

Fenton, A. F.

LICHENS AS INDICATORS OF ATMOSPHERIC POLLUTION. *Irish Nat. J. (Belfast), 13(7):153-159, July 1960. 5 refs.*

Lichens as indicators of atmospheric pollution were investigated with respect to studies to determine if the lichen genera could be arranged in order of their tolerance to smoke and the general atmospheric pollution of Belfast. Lichen vegetation within the actual city boundary, in open sites, and along one of the main exit roads from the city was examined. Crustaceous lichens were the most tolerant of atmospheric pollution, increasing in prevalence and species with falling values of atmospheric pollution. Foliaceous lichens only appeared when the pollution decreased somewhat and thereafter increased rapidly with increasing atmospheric purity. Fruticose lichens appeared last and were apparently the most susceptible to air impurities.

19159 APTIC NO. 37047

Gerlach-Tharandt, R.

TESTS AND EXPERIENCE IN FORESTRY. XI. ABSORPTION AND ACCUMUATION OF SULFUROUS (SO2) AND SULFURIC (SO3) ACID IN THE NEEDLES OF OUR ORDINARY SPRUCE. *(Ueber forstliche Versuche und Erfahrungen. XI. Aufnahme- und Aufspeicherungsfaehigkeit von Schwefeliger Saeure (SO2) und Schwefelsaeure (SO3, Beziehentlich H2SO4) in den Nadeln unserer gemeinen Fichte). Text in German. Tharandter Forstl. Jahrb., vol. 76:224-232, 1925.*

Absorption and accumulation of sulfur trioxide in spruce needles from two forest lots exposed to the same paper producing plant emissions for more than 40 years is illustrated by analytical data from studies carried out between 1890 and 1902. The factory is located in a valley on both sides of a creek; its emissions are carried by winds. Average SO3 values (where SO3 stands for the sum of both sulfur dioxide and sulfur trioxide) on lot no. I were 0.385%, 0.444%, and 0.526% (per 100 G dry matter) in 1890, 1897, and 1902 respectively. Lot no. II showed 0.289%, 0.430%, and 0.525% SO3 values in 1892, 1896, and 1902 respectively. Average SO3 accumulation in needle samples from lot no. I was 15% from 1890 to 1897, 18.5% from 1897 through 1902 and constitutes a total of 36.2% from 1890 through 1902. Samples from Lot no. II show accumulations of 48.7%, 21.9%, and 81.3% through the 1892/1896, 1896/1902, and 1892/1902 periods, respectively. Exposure of Lot no. II to pollutant emissions started eight years later than that of lot no. I. The inhanced effects upon Lot no. II are attributed to its topographic site and to its exposure to frequent winds. The generally increasing SO3 levels in the spruce needle samples is attributed to time and technological factors (increased charcoal consumption). Maximum SO3 accumulation levels in spruce needles before falling off cannot be deduced from these data.

19160 APTIC NO. 36996

Hajduk, Juraj

EXTENSION GROWTH IN SEEDLINGS AS A BIOLOGICAL TEST OF SOILS CONTAMINATED WITH FLUORINE EXHALATES. *(Verlaengerungswachstum der Keimlinge als biologischer test von durch Fluorexhalate intoxizierten Boeden). Text in German. Biologia, 24(10):728-737, 1969. 19 refs.*

Biological tests based on measurements of pea and barley seedling root extension growth to evaluate the toxicity of fluorine exhalates from an aluminum plant were carried out. The aluminum plant is located in the Hron River Valley and exposed to northwest and north winds with a hilly background on its southern side; the location is characterized by 30% still days/year. Soil located varying distances from the emission source and control soil treated with known amounts of dust from the fusion electrolysis shop of the factory were used for the seedling growth experiments. Lowest growth rates of pea seedling roots appeared on the soil exposed to the highest amounts of fluorine contamination as affected by meteorological and topographic interactions. Inhibition of pea seedling root growth was well correlated with the amounts of fluorine-contaminated dusts added to the control soils. Pea seedlings can be utilized as a biological testing species for the evaluation of fluorine contamination of soils exposed to this pollutant. Barley seedlings elicited irregular reactions and, thus, were rejected as unsuitable for similar tests.

19161 APTIC NO. 36993

Haut, H. van and H. Stratmann

EXPERIMENTAL STUDIES ON THE EFFECTS OF SULFUR DIOXIDE UPON VEGETATION. *(Experimentelle Untersuchungen ueber die Wirkung von Schwefeldioxyd auf die Vegetation). Forschungsber. Landes Nordrhein-Westfalen, no. 884:1-63, 1960. 33 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 73p., Aug. 1971.*

Plants were exposed to sulfur dioxide concentrations in test chambers in order to determine the effects of the following parameters upon the causation of damage: concentration and exposure time, stage of development, climatic factors, and nutritional factors. These effects are considered for agricultural plants, flowers, deciduous trees, and conifers. Results from the environmental chamber studies cannot be applied directly to field conditions, but they provide important reference information for the determination of tolerance limits in field experiments and thus for the evaluation of an emission level with regard to the danger to vegetation which it engenders.

19162 APTIC NO. 37021

Janson, A.

ON FLUE GAS DAMAGE. *(Ueber Rauchsaeureschaeden). Text in German. Angew. Botan., vol. 7:46-52, 1925.*

Plants are a more reliable source of information about the presence of air pollutants than chemical or microscopic studies. Sulfur dioxide is the main noxious agent for the plant world. A range of susceptibility to this agent includes plant species such as ordinary spruce and vegetable garden beans. These species are marker species in pollution exposed areas. Breeding and cultivation may affect plant susceptibility to pollutants. Reference is made to certain apple tree species for which highly resistant features against adverse weather conditions were developed, but which, nevertheless, are highly susceptible to pollutants, as opposed to other apple species. Differences in susceptibility may occur within the same species. The diffusion of SO2 is an important factor affecting plant damage. The higher the stack of the emitting source, the more delay is seen in the pollutant effects.

19163 APTIC NO. 37352

Kaemmerer, Kurt

THE TOXICOLOGICAL SIGNIFICANCE OF SULPHITE FED TO RUMINANTS. *(Zur toxicologischen Bedeutung von Sulfit beim Wiederkaeuer). Text in German. Zucker, 25(4):123-127, Feb. 1972. 30 refs.*

The effects of sulfur dioxide and sulfites are discussed based on a literature survey. During the burning of coal or fuel oil, sulfur dioxide, sulfur trioxide, or sulfuric acid are emitted. Inhalation of sulfites or sulfur dioxide causes toxic reactions, such as mucous membrane infections. Ruminants tolerate considerably larger amounts of sulfites than man or monogastric animals. The pre-rumen system in ruminants acts as a dilution and buffer system. Prolonged feeding of sulfite-containing dry pulp, which usually holds about 1000 ppm SO2, causes no disorders.

19164 APTIC NO. 37041

Koeck, Gustav

FREQUENT ERRORS AND THEIR PREVENTION IN INTERPRETING FLUE GAS DAMAGE ON FORESTS. *(Ueber einige bei forstlichen Rauchschadenerhebungen haeufig begangene Fehler und ihre Vermeidung). Text in German. Z. Pflanzenkrankh. Pflanzenschutz, vol. 44:81-91, 1934.*

The complexity of flue gas damage evaluation problems is discussed. Knowledge of the emission source in terms of its technology and schedule and of the origin and amounts of fuel utilized constitutes the first stage of information. Sulfur content in coal may vary from 0.1 to 6.0%; the amount of sulfur dioxide contaminating the exposed area depends on the number and height of stacks the source is provided with. Information should also be available on whether certain control equipment to reduce emissions is being used by the source. Forest damage or spruce needles should be studied macroscopically, microscopically, and chemically. Analytical determinations on both air and plant samples should always be carried out against pollutant free control samples. Meteorological conditions constitute a factor of major importance; samples should be analyzed at least during the months of June and September. Soil samples around the trees subjected to SO2 analysis should also be analyzed. The trees which are chronically exposed to flue gas damage become more susceptible to insect and fungal disease. The need for a broad knowledge of chemical, meteorological, and phytopathological aspects for the evaluation of flue gas damage induced to forests is emphasized.

19165 APTIC NO. 37735

Majernik, Ondrej and T. A. Mansfield

STOMATAL RESPONSES TO RAISED ATMOSPHERIC CO2 CONCENTRATIONS DURING EXPOSURE OF PLANTS TO SO2 POLLUTION. *Environ. Pollut., 3(1):1-7, Jan. 1972. 15 refs.*

Stomata provide the main routes for entry of pollutants into the leaves of higher plants, and it has been suggested that inhibitors of stomatal opening could be used to protect plants against pollution. Experimental evidence is presented indicating that the stomatal closing response to carbon dioxide still occurs in the presence of sulfur dioxide, even during conditions in which sulfur dioxide alone stimulates stomatal opening. The increases in carbon dioxide concentration that occur in polluted atmospheres appear to be sufficient to cause partial stomatal closure. The variability between individual plants in the magnitude of the stomatal response to carbon dioxide is considerable, and the response could be one useful criterion to employ for selective purposes when crop varieties are produced for growing in polluted areas. Plants of broad bean were used in the experiment. (Author abstract modified)

19166 APTIC NO. 37045

Materna, Jan

INDUSTRIAL AIR POLLUTION AND FORESTRY. *(Prumyslove exhalace a lesni hospodarstvi). Text in Czech. Les. Pr., 45(10):433-439, 1966.*

The most prominent air pollutant affecting forestry is sulfur dioxide, generated primarily by power stations which use fuel of fossil origin. Sulfur dioxide can cause damage to trees; It may take several years until the damage to becomes apparent in its characteristic forms, such as falling off of older needles, loss of density of the crown, drying of branches in shadowy parts of the tree, drop in overall vitality, and the eventual death of trees. Contrary to earlier assumptions which regarded a concentration of one mg SO2/cu m air as the minimum for bringing about such damage, more recent studies conducted in Bohemian areas have shown that, under long term conditions, a concentration of 0.1 mg SO2/cu m will be sufficient to cause visible damage to older trees. Experiments with induced smoke emissions in tree nurseries have shown that under certain conditions such as warm weather and clear sunshine, acute damage to individual young trees was caused after a short time of exposure to an SO2 concentration of about one mg/cu m of air, characterized by a change of color of the needles. Under normal circumstances, a 5 to 10 mg/cu m concentration of SO2 acting upon young pine trees can bring about distinct damage, characterized by a rapid change of needle color to red and dying off of the youngest needles. The youngest leaves show maximum damage in deciduous trees under similar circumstances. Economically, the acute effects are of much less importance than the chronic damage caused by long term low concentrations of the pollutant. Forestry can combat these conditions to some extent by cultivating more resistant species and by regular removal of dead and underdeveloped trees. Fertilizing also contributes to increased resistivity. However, ways of reducing the quantities of pollutants emitted into the atmosphere should be found.

19167 APTIC NO. 37239

McGrath, James J. and John V. Moffa

SYSTEM TO EVALUATE THE INFLUENCE OF CHRONIC EXPOSURE TO CO ON THE HATCHING EGGS OF THE WHITE LEGHORN CHICKEN. *J. Air Pollution Control Assoc., 22(2):123, Feb. 1972. 3 refs.*

The effect of chronic exposure to carbon monoxide on the hatchability of White Leghorn chicken eggs was studied using an exposure chamber designed to maintain a constant CO atmosphere during the hatching period. A meter initiated an error signal whenever the CO concentration dropped below a preset value. The signal in turn operated a solenoid valve connected in series to the CO source; when the present level was restored the solenoid valve closed to halt further addition of CO. Eggs (33) incubated under CO-free conditions had a hatchability of 78.8%. Eggs (24) incubated at 100 ppm CO had a hatchability of 62.5%, while eggs (30) incubated at 200 ppm had an estimated hatchability of 13.3%. Only four embryos in the 200 ppm group were alive when the eggs were opened.

19168 APTIC NO. 37038

Neger, F. W.

A NEW UNFAILING CRITERION FOR FLUE-GAS DAMAGE ON DECIDUOUS TREES. *(Ein neues, untruegliches Merkmal fuer Rauchschaeden bei Laubhoelzern). Text in German. Agnew. Botan., vol. 1:129-138, 1919. 5 refs.*

Lenticel damage in trees exposed to sulfur dioxide is considered as a criterion for flue gas damage on deciduous trees. Concentrations ranging from 0.001, to 0.00005 SO2 were applied in laboratory conditions where ash tree, lime, and Norway maple branches appeared to be the most sensitive species. Damage was most severe in lenticels near the intensely respiring sprout buds. Ash tree lenticel damage occurred when exposed to SO2 concentrations between 0.0001 and 0.00005. Oak, beech, apple, and birch trees appeared to be less sensitive. Field tests carried out in sulfur dioxide polluted areas confirmed the laboratory findings. Lenticel damage and browning of the surrounding portions elicited microscopically the same pattern as the damage induced under laboratory conditions. Adverse weather conditions such as frost or heat which may induce deadly damage to sprouts appear to produce different effects than the specified lenticel damage.

19169 APTIC NO. 37567

Oelschlaeger, W.

FLUORIDE UPTAKE IN SOIL AND ITS DEPLETION. *Fluoride, 4(2):80-84, April 1971. 6 refs. (Presented at the International Society of Fluoride Research Conference, Annual, 3rd, Vienna, Austria, March 2-25, 1970.)*

The magnitude of fluoride uptake by soil from artificial fertilizers was determined. The values were compared with the amount of F(-) removed through harvesting crops and through seepage water. Fertilization of cereals, potatoes, grass, fodder, beets, and sugar beets with superphosphates added from 8-20 kg F(-)/ha to soil. On the other hand, these plants, when harvested, contained only 5-80 g F(-)/ha or 0.1-0. 4% of the added F(-). The F(-) accumulation in soil containing 200 ppm F(-) (a general average) after fertilization with superphosphate was 1.3-4.5% annually. Removal of F(-) from soil by seepage water was estimated at 30 widely separated agricultural and wooded areas. Fluoride loss through seepage water averaged 52-208 micrograms/l, depending on levels of clay and lime in the soils and on the marked relation between the F(-) content of the water and the runoff. From 0.5-6% of the yearly added increment was thus removed. In a nonpolluted area, therefore, considerable amounts of F(-) accumulate in soil from fertilizers. In some instances, they constitute up to 90% of the amounts which are added to the ground. (Author abstract modified)

19170 APTIC NO. 37688

Pellissier, M., N. L. Lacasse, C. D. Ercegovich, and H. Cole, Jr.

EFFECTS OF HYDROCARBON WAX EMULSION SPRAYS IN REDUCING VISIBLE OZONE INJURY TO PHASEOLUS VULGARIS PINTO III. *Plant Disease Reptr., 56(1):6-9, Jan. 1972. 12 refs.*

The effect of a paraffinic hydrocarbon wax emulsion on the response of bean plants Pinto III to zone was investigated. The upper lower, or both surfaces of the leaves of 10-day-old plants were sprayed with the emulsion at rates of 1, 5, and 10 ml/l water. Some plants were only treated on half the leaves with 10 ml/l water. One day after the treatment, the plants were fumigated under controlled conditions with 25 pphm ozone for 4 hr. Plants sprayed with a water solution of the emulsion at the rates of 5 or 10 ml/l showed 95-100% protection from visible ozone injury. At a concentration of 1 ml/l, 30-50% protection was obtained. Only the sprayed leaves or leaf parts were protected, and coverage of both leaf surfaces was required for complete protection. (Author abstract modified)

19171 APTIC NO. 37046

Pollanschuetz, J.

DETERMINATION OF INCREMENT LOSSES CAUSED BY EMISSIONS. *(Erfassung der als Folge von Immissionen eingetretenem Zuwachsverluste). Text in German. Schweiz. Z. Forstwesen, no. 117:798-808, 1966. 12 refs. (Presented at the Rauchschaeden in Oestereich Symposium, Nov. 1965.)*

A mathematical approach for the evaluation of wood damage caused by pollutants is presented. Three basic categories of damage are reviewed. The first category refers to acute effects produced by high concentrations of toxic pollutants and leading to death of entire wooded areas. The second and third categories include chronic damage affecting the growth rates of different trees of a certain population. The calculation of damages focuses on these latter categories; the annual ring increment is the basic element applied. Ratios such as measured annual rings compared with expected annual rings are considered as annual ring indexes. Comparisons between annual ring indexes of damaged trees and those of healthy trees produce the relative index (RI). Dividing the established radial increment of damaged specimens through the appropriate RI, a useful evaluation of the radial increment without the bark is obtained. Knowing these data, the formula for the computation of total increment loss can be applied.

19172 APTIC NO. 37480

Rippel, A.

EFFECT OF FLUORIDE EMISSION ON ANIMAL PRODUCTS. *Fluoride, 4(2):89-92, April 1971. 8 refs. (Presented at the International Society of Fluoride Research Conference, Annual, 3rd, Vienne Austria, March 22-25, 1970.)*

Fluoride assays were made over a 3-year period of milk and eggs produced by animals raised within 100 m of an aluminum smelter. Milk from eight cows, 4 to 9 yrs old, averaged 0.6 mg fluoride/l. Milk produced in the morning contained an average of 0.5 mg F, while evening milk contained 0.7 mg F/l. The highest fluoride, content, an average of 0.94 mg/l for 18 months, was noted in the milk of a young heifer. The F(-) in th yoke of chicken eggs averaged 1.2 ppm. This value was only slightly higher than that of the controls (1.1 ppm). However, the fluoride content of egg shells in the exposed area was nine times higher than in the control eggs. The differences in thr fluoride content of milk and eggs confirms the fact that poultry are relatively more resistant to fluoride emissions than cattle. (Author abstract modified)

19173 APTIC NO. 37059

Rose, Francis

LICHENS AS POLLUTION INDICATORS. *Your Environ., 1(5):185-189, 1970. 16 refs.*

Because of their sensitivity to toxic gases, lichens, especially epiphytic varieties offer a means of biological assay of air-pollution effects. In general, damage to lichens or the disappearance of sensitive species correlates best with mean winter levels of sulfur dioxide, measured in microgram/cu m. The effect of peak levels is less well known and less easy to correlate because of lack of data. Since adequate measurements of SO2 are usually available in highly polluted areas, it is in rural areas that lichens are most valuable as pollution indicators. Detailed maps have been prepared for southeast England of the occurrence of lichen species with different specific tolerances to SO2. These maps show clear patterns of occurrence in successive zones south from London, the zones corresponding well with measured mean winter SO2 values.

19174 APTIC NO. 36942

Schnaider, Zbigniew and Zbigniew Sierpinski

DANGEROUS CONDITION FOR SOME FOREST TREE SPECIES FROM INSECTS IN THE INDUSTRIAL REGION OF SILESIA. *(Stan zagrozenia przez owady niektorych gatunkow drzew lesnych w okolicach przemyslowych Slaska). Text in Polish. Inst. Badaw. Lesn., Pr. Badaw., no. 316:113-150, 1967. 18 refs.*

Tree cultures grown in industrial pollution exposed areas appear to be more susceptible to pest invasion than those grown under clean air conditions. Insects sometimes invade 50% of the tree population but their frequency iis decreased in highly fume-polluted areas. Forest culture, exploitation, and protection measures must be well synchronized in order to prevent pest invasion in industrially air polluted areas. Primary tasks including improvement of sanitary conditions of the older coniferous forests and protection of deciduous trees against xylophagous pests in the industrial areas of Silesia are emphasized.

19175 APTIC NO. 36994

Scholl, G.

INFLUENCE OF PHYTOTOXIC EMISSIONS ON THE GROWTH OF HORTICULTURAL AND AGRICULTURAL CROPS. *(Einfluss phytotoxischer Immissionen auf das Wachstum landwirtschaftlicher und gaertnerischer Kulturen). Text in German. Landwirt. Forsch. Sonderh., no. 19:166-176, 1965. 20 refs.*

The effect of emissions from a metallurgical plant, including sulfur dioxide and fluorine derivatives, on plant growth was investigated during a three-year period. The 12 month average SO2 content ranged from 0.24 to 0.30 mg/cu m above the two experimental lots. The damaging effects were focused on the leaves and consisted in color alteration and necrosis. Plant growth and yield effects varied according the climatic conditions, species, and stage of growth. Winter rye and leek appeared to be the most emission-resistant species. Highest yield losses were produced in certain bean species, spinach, and summer barley. Barley accumulated the highest amount of sulfur which increased from 0.54 to 0.83% (dry matter) in the leaves at the end of the third year of the experimental period. Fluorine content ranged from 3.0 (spinach) to 26.2 (summer barley) mg/100 g dry matter during the second year of the experiment.

19176 APTIC NO. 37539

Sherwood, C. H., J. L. Weigle, and E. L. Denisen

TWO, FOUR-D AS AN AIR POLLUTANTS: EFFECTS ON GROWTH OF REPRESENTATIVE HORTICULTURAL PLANTS. *HortScience, 5(4):211-213, Aug. 1970. 13 refs.*

The response of representative horticultural plants to ppb levels of the herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) was studied using a diffusion test circle consisting of concentric circular rows divided into arcs and having a source of 2,4-D vapors at the center. Symptoms varied, but were about equal in severity throughout the 360 deg of coverage. Susceptible plants in the rows close to the source were markedly stunted and deformed; plants in the intermediate rows tended to show apparent stimulation. In the outer circles (lower exposures), vegetables were larger, less misshapen, and earlier ripening. More fruit was produced and the sugar content was higher. Geranium cultivars raised from virus (measles)-innoculated stock were less obviously affected by 2,4-D and tended to produce more shoots free of virus symptoms. The data suggest that economic effects from background pollution may be greater than those associated with more easily recognized acute reaction to 2,4-D pollution.

19177 APTIC NO. 37002

Skawina, Tadeusz, Irena Szalonek, Maria Warteresiewicz, and Tadeusz Wachalewski

APPLICATION OF A PLANT TEST FOR THE EVALUATION OF AIR POLLUTION BY SULFUR DIOXIDE. *(Zastosowanie testu roslinnego do oceny stopnia zanieczyszczenia powietrza atmosferycznego dwutlenkien siarki). Text in Polish. Postepy nauk roln (Warsaw), 3(87): 17-31, 1964. 17 refs.*

A relationship between the amount of sulfur dioxide in the polluted air and sulfates determined in rye leaves was established. This relationship provides the possibility to characterize the degree of SO2 contamination in different areas. Accumulation of SO2 in rye leaves occurred throughout the vegetation cycle, but its final stage appeared to be the most appropriate for sample analysis. No relationship between sulfate amounts found in leaves and those determined in the respective grounds could be established. The sulfate levels determined in rye leaves depended on the amount of SO2 in the polluted air as affected by emission source, geographic location, meteorological conditions, and prevailing wind directions.

19178 APTIC NO. 37249

Skelly, J. M., L. D. Moore, and L. L. Stone

SYMPTOM EXPRESSION OF EASTERN WHITE PINE LOCATED NEAR A SOURCE OF OXIDES OF NITROGEN AND SULFUR DIOXIDE. *Plant Disease Reptr., 56(1):3-6, Jan. 1972. 10 refs.*

The synergistic effects of sulfur dioxide and industrial emissions of nitrogen oxides (nitric oxide and nitrogen dioxide) on eastern white pine (Pinus strobus) and three other conifer species were investigated. Ambient levels of the pollutants were recorded at seven monitoring stations. The highest 1-hour concentration of NOx was greater than 0.585 ppm at a station 600 yards downdwind from the source and the highest 2-hour SO2 concentrtion was 0.690 ppm at a station 400 yards downwind from the source. Eastern white pine seedlings and larger trees were the most severely affected and exhibited acute symptoms, including tip burn, chlorotic mottle, and stunted growth. (Author abstract modified)

19179 APTIC NO. 36939

Snyder, Joan M. and L. H. Wullstein

NITROGEN FIXATION IN PIONEER ECOSYSTEMS OCCURRING ON GRANITE OUTCROPS. *Preprint, Utah Univ., Salt Lake City, Dept. of Biology, 13p., 1971. 14 refs.*

The process of nitrogen fixation in pioneer ecosystems was investigated, since the ecosystems contain relatively few species of plants, some of which may be susceptible to certain air pollutants. Furthermore, species exhibiting nitrogen fixation potential may also fix such pollutants as nitrogen oxides since these can be competitive inhibitors of nitrogen fixation. Four lithophilous lichens and one moss from a granite outcrop were tested for nitrogen fixation with the acetylene-reduction method. All the plant samples fixed nitrogen. Azotobacter was the principal N2 fixer for all the plants and the moss (Grimmia laevigata) inhibited N2 fixation of the Azotobacter associated with it. (Author abstract modified)

19180 APTIC NO. 36943

Tesar, Vladimir

FORESTRY APPLIED TO PINE TREES OF MEDIUM AGE EXPOSED TO SULFUR DIOXIDE EMISSIONS. *(Hospodareni ve smrkovych porostech stredniho veku zasazenych kyslicnikem siricitym). Text in Czech. Les. Pr., 49(9):392-397, 1970.*

The increasing number of electric power plants in Czechoslovakia using coal or naphtha as fuel brings about proportionately more cases where pine forests are exposed to the ill effects of sulfur dioxide. This pollutant attacks the needles, gradually reducing their number and density, and causing the possible death of the tree. If such conditions prevail, the recommended practical approach to primarily preserve trees of medium age, since these give the best yield in timber volume and therefore represent the greatest value from an economic point of view. An inventory of the remaining trees should be made, based on a classification which divides them into three classes according to condition of needles, namely: Grade one, with a small degree of damage, grade two with a medium degree, grade three with a heavy degree of damage. The individual trees should be marked accordingly, and then grades one and two marked for cutting every third year; grade three should be cut every year. At the time of felling, the principle of selection is to remove the specimens which indicate a shorter life expectancy, and to retain the trees of stronger appearance. No scientific accessories are available for the aforementioned classifications which, therefore, have to be arrived at by observation and experience.

19181 APTIC NO. 37710

Ulrich, B.

FOREST FERTILIZATION AND ENVIRONMENTAL PROTECTION. *(Forstduengung und Umweltschutz). Text in German. Allg. Forstz., 27(9/10):147-148, March 1972. 9 refs. (Presented at the Tagung des Arbeitskreises Forstduengung, Bremen, West Germany, June 5, 1971.)*

In the Federal Republic of Germany 5 million tons of sulfur dioxide are annually emitted by industries and domestic heaters. In view of the location of Germany in the center of Europe it can be assumed that a certain quantity of SO2 is washed out from the atmosphere by precipitation and carried into the soil. Studies of the SO2 input into the soils of forests and fields by precipitation have shown that it amounts to between 18 and 56 kg S/hectare; in the vicinity of industries and in spruce forests, it is more. The latter have a filtering effect for SO2 which leads to a considerable acidification of the soil (pH 3.5) so that the growth of seedlings and surface-rooting grasses and herbs is impaired. The hydrogen ions of sulfuric acid are consumed in the soil by the clay minerals and aluminum ions are liberated. This deteriorates the percolating water quality. Whether it affects the groundwater depends on the permeability of the layers between the top soil and groundwater. In order to avoid lasting damage of the spruce forest, fertilization with 100 kg calcium oxide/hectare every 35 to 70 yrs is necessary. Beeches do not have the filtering effect of spruces.

19182 APTIC NO. 37736

Wellburn, A. R., O. Majernik, and Florence A. M. Wellburn

EFFECTS OF SO2 AND NO2 POLLUTED AIR UPON THE ULTRASTRUCTURE OF CHLOROPLASTS. *Environ. Pollut., 3(1):37-49, Jan. 1972. 33 refs.*

The ultrastructure of mature bean tissue exposed to air polluted by various concentrations of sulfur dioxide or nitrogen dioxide at maximum stomatal aperture for short periods was compared with similar unpolluted tissue, using an electron microscope. Both pollutants caused swelling of the thylakoids within the chloroplasts, but no extra-chloroplastidic damage was detected. The thylakoid swelling could be reversed by removing the pollutant from the air flow or changing the rate of gas flow within the tissue. The phenomenon is discussed in relation to previously reported dimunution in the rate of photosynthesis when higher plants are exposed to either sulfur dioxide or nitrogen dioxide. (Author abstract)

19183 APTIC NO. 36998

Wentzel, K. F.

THE EFFECTS OF INDUSTRIAL AIR POLLUTANTS AND LIME FERTILIZERS ON SMOKE-EXPOSED GROUNDS. *(Zur Bodenbeeinflussung durch industrielle Luftverunreinigungen und Duengung in Rauchschadenslagen, insbesondere mit Kalk.) Text in German. Forst-Holzwirtschaft, 14(8):178-182, 1951. 31 refs. (Presented at the Bezirksgruppentagung des Bundes Deutscher Forstmaenner, Muenster, West Germany, Jan. 22, 1959.)*

While air is only a temporary carrier of industrial pollutants, the soil is the final site of their absorption. Sulfur dioxide and fluorine compounds are the main smoke constituents and metal oxides and silicic acid are the main dust constituents absorbed by soil. Sulfur dioxide containing smoke elicits an acid pH. Conversion of SO2 into sulfurous or sulfuric acid which is then conveyed into the ground by rain or snow increases soil acidity. The available free bases of the soil are then converted into insoluble sulfates, depriving the plants of an important nutritional requirement. Forests are the most susceptible to damage from smoke because of their poor buffering properties and their initial low base contents. Metallurgical processing, cement, and electric power producing plants are the main dust emission sources. Dusts may elicit acid, neutral, or alkaline pH, according to their chemical composition. Dust fall inflicts severe damage to soil structure. Application of fertilizers such as lime would prevent the acidifying effects from smokes and would improve plant resistance against noxious agents. Fertilizer application would also provide a means for the protection of soil structure.

19184 APTIC NO. 36950

Wieler

THRESHOLD CONCENTRATIONS OF SULFUROUS ACID FOR PLANT DAMAGE. *(Die Grenzkonzentration fuer die Schaedigung der Vegetation durch schwefelige Sacure). Text in German. Z. Pflanzenkrankh. Pflanzenschutz, no. 28:97-105, 1918. 12 refs.*

The problem of the applicability of studies carried out under laboratory conditions to those of the field is discussed and illustrated. Tree species have been exposed to smoke, including various concentrations of sulfur dioxide in a greenhouse. A 2.0 ppm SO2 concentration limit was established for the most sensitive ordinary spruce species using needle browning as a criterion. Air sample analysis carried out at 1200 m and 2400 m from an industrial source disclosed considerably high SO2 concentrations, which appeared to be harmless to the surrounding forests. The error in setting the allowable concentration at 2.0 ppm consisted in the neglect of a temperature factor. In a greenhouse exposed to light radiation, part of the radiation is absorbed by the chloroplasts for photosynthesis needs, while the excess light radiation is converted into heat. Thus, the tree leaves or needles must have reached temperatures exceeding by far the controlled temperature of the secluded environment. The free air conditions differ due to air mobility which helps the maintenance of the plant temperature balance through perspiration on account of the continuous air flows or other heat transfer processes. A study should be made to see whether the chronic smoke damage is actually a temperature effect or whether increased temperatures enhance plant cell susceptibility towards SO2.

19185 APTIC NO. 37403

Woltz, S. S., W. E. Waters, and D. C. Leonard

EFFECTS OF FLUORIDES ON METABOLISM AND VISIBLE INJURY IN CUT- FLOWER CROPS AND CITRUS. *Fluoride, 4(1):30-36, Jan. 1971. 11 refs. (Presented at the Conference of the International Society of Fluoride Research, Annual, 3rd, Vienna, Austria, March 22-25, 1970.)*

Experiments were conducted to determine the susceptibility of horticultural crops grown in Florida to damage from fluorides. Atmospheric fluorides were considered, as well as fluorides derived from soil and water. Fluoride taken up by gladiolus roots caused foliar damage only when soil pH was low and F(-) containing superphosphate was applied in relatively excessive amounts. The damage to leaves occurred more to leaf interior than to margins and tips as in F(-) fumigation. Fluoride in leaves moved passively with the transpiration stream of water and accumulated at the terminus of translocation. Rose and gladiolus cut flowers were damaged by low F(-) concentrations in vase water, while chrysanthemums were less affected. De novo chlorophyll synthesis in Vigna sinensis seedling leaves was inhibited by F(-) absorbed by detached seedling tops. The yield of Valencia orange fruit was depressed by airborne F(-). Valencia leaves were reduced in size, had decreased photosynthetic rates, and had decreased chlorophyll content in response to increasing levels of airborne F(-). (Author abstract modified)

19186 APTIC NO. 36968

Wullstein, L. H. and Kristen Snyder

ARSENIC IN THE ECOSYSTEM. *Preprint, 4p., 1970. 24 refs. (Presented at the International Air Pollution Conference, 1970.)*

The effects of arsenic on rates of mineralization in soil were investigated using samples subjected to pollution from a copper smelter. The samples contained up to 245 ppm arsenic compared with control samples containing 10 ppm arsenic. Mineralization was studied by adding a constant amount of peptone to the samples and comparing the rates of ammonification, nitrosofication, and nitrification. Then concentrations of 50, 150, and 250 ppm arsenic were added to the control samples and similar mineralization rates were determined. Ammonification rates of the polluted and control samples amended with both peptone and arsenic were similar; however, rates at which ammonium was oxidized differed. Nitrosofication and nitrification rates of the polluted samples were reduced compared to those of the control samples. Field methods of soil sampling, laboratory procedures, including determination of moisture, pH, total and gaseous arsenic, total nitrogen, and soil respiration, and complete test results are discussed. (Author abstract modified)

EFFECTS-MATERIALS

19187 APTIC NO. 37242

AIR POLLUTION AND ALTERATION OF CONSTRUCTION MATERIALS. *(Pollution atmospherique et alterations des materiaux de construction.) Text in French. Peintures, Pigments, Vernis, 47(12):625-627, Dec. 1971.*

A standard draft on atmospheric pollution was submitted by the Association Francaise de Normalisation (AFNOR) in 1966. Smoke content can be determined in mg/cu m, by means of a relectometer using the degree of blackening, for example. Lichens, being very sensitive to air pollutants, vanish from industrial areas. Non biodegradable plastic wastes now create a growing problem. The three basic factors of atmospheric corrosion are sulfur dioxide, humidity, and chlorine ions. According to a 1971 report by the Committee on Corrosion and Protection to the Secretary of State for Trade and Industry, the estimated losses due to metal corrosion amounted to 1,365,000,000 pounds in Great Britain, of which 310,000,000 pounds could have been saved by strict and controlled application of pollution control methods and techniques already available.

19188 APTIC NO. 37003

Bienkiewicz, Genowefa

INVESTIGATIONS OF ATMOSPHERIC CORROSIVENESS AND THE PERMANENCE OF PROTECTIVE COATINGS IN UPPER SILESIA. *(Badania agresywnosci atmosfery i trwalosci powlok ochronnych na terenie Gornego Slaska). Text in Polish. Ochr. Koroz., 10(5):182-186, 1967. 8 refs.*

Results of measurements of the concentration of corrosive elements in the atmosphere of the industrial area of Upper Silesia, Poland, showed 1-14 mg sulfur dioxide/cu m, 0.007-11 kg dust/sq m/month, 100-15,000 microsiemens of electroconductive precipitation, and an unprotected steel corrosion rate of 0.025-0.4 mm/year. After two years of testing, the best protection against corrosion was offered by phthalate coatings consisting of a priming paint and surface enamel; combined phthalate and chlorine-caoutschouc coating; and epoxide coating. Good results were also obtained in tests on aluminum and zinc spraying, but life-cost factors required further testing.

19189 APTIC NO. 37666

Binanzer, P., N. Distelrath, and A. V. Krusenstjern

CORROSION PROPERTIES OF CHEMICALLY PRODUCED PROTECTION LAYERS ON PRESSURE-CAST MAGNESIUM. *(Korrosionsverhalten chemisch erzeugter Schutzschichten auf Magnesiumdruckguss). Text in German. Metall (Berlin), 26(3):232-236, March 1972. 8 refs.*

Magnesium samples were subjected to a sulfur dioxide test, a moist climate test, and a salt dipping test. The samples were placed in a test unit with an air volume of 300 l to which 2 l of sulfur dioxide were added. After heating to a water temperature of 40 C water vapor condensed on the samples. The sulfur dioxide precipitated in the dew distributed uniformly over the samples. After 8 hrs, the unit was opened and the samples were left for 16 more hours in the open container at room temperature. This procedure was performed 5 times. Prior to the test, all samples including the control sample were weighed. After each test, the weight was determined again. The weight losses ranged from 488 mg/sq dm for magnesium with the addition of potassium aluminum-sulfate to 636 mg/sq dm of the manganese-magnesium sulfate treated sample. The untreated magnesium sample had a weight loss of 541 mg/sq dm.

19190 APTIC NO. 37711

Rasch, Rudolf

FLUE GAS SIDE CORROSIONS. DESCRIPTION OF TYPICAL DAMAGES, CORROSION MECHANISM, AND MEASURES FOR PREVENTION. *(Rauchgasseitige Korrosionen. Typische Schadensbeschreibungen, Korrosionsmechanismus und Massnahmen zur Verhuetung). Text in German. Tech. Mitt., 65(2):82-88, Feb. 1972. 38 refs.*

Fire-side high-temperature corrosion in boilers occurs in form of tightly adhering incrustations under the formation of an intermediary layer, in the form of material erosions, and nest-like indentures. Through thermodynamic and crystallochemical methods the reaction mechanism leading to the various types of corrosion can be determined. Tightly adhering incrustations are due to sulfate corrosion, material erosions are caused by hydrogen chloride corrosion, and nest-like indentures are due to sulfide corrosion. All corrosion processes are initiated and accelerated by alternating oxidation and reduction. For the prevention of incrustations, a coating of the heat exchanger surfaces with magnesium oxide proved suitable. Magnesium oxide forms loosely adhering sulfates with sulfur dioxide which can be removed by blowing. Hydrogen chloride corrosion can be avoided by oxidizing operating conditions. Like the HCl corrosion, the sulfide corrosion is connected with reducing operating conditions. Hydrogen sulfide forms heavy metal sulfides by reaction with iron (II)oxide and with nickel oxide. Heavy metal sulfides may also form via iron 0(II)sulfate and nickel sulfate. For reduction of th direct reaction between sulfates and the metal phase, all methods which lead to a reduction of the sulfate deposition are applicable. It also helps to increase water vapor partial pressure in the combustion chamber.

EFFECTS-ECONOMIC

19191 APTIC NO. 37746

Dahl, Eilif

COSTS INVOLVED IN ATMOSPHERIC SULFUR OXIDES EMISSIONS. *(Kostnader ved utslipp av svoveloksyder i atmosfaeren). Text in Norwegian. Tek. Ukeblad (Oslo), 118(50):15-16, Dec. 1971. 4 refs.*

Damages and costs involved in sulfur oxides emissions are discussed with special regard to Sweden s case study for the United Nations conference on the human environment. Costs of emissions from a 100 m stack at a thermal power plant are evaluated. The assumption is made that 30% of the total sulfur oxide emission is deposited in the sea, 50% over forests, and 10% on dry land. The amount of lime required to neutralize 100 kg of sulfuric acid in soil entails a total cost of $1.54. In forests, 500 kg of sulfuric acid deposited causes a reduction in the rate of growth corresponding to a loss of $2.13/yr. The costs involved in the acidifying of lakes and streams cannot be estimated. Swedish estimations regarding costs caused by corrosion and damages to coatings are reviewed. The life of coatings is 20% shorter in cities than in the country with relatively unimportant air pollution. Based on Swedish calculations, the total direct damages may be esteemed to cause costs of up to $140/ton of sulfuric acid emitted. The total effect of measures for the reduction of sulfurous emissions is positive against the above costs. Thus, nationwide action is motivated. To reduce the sulfur content of fuel oils from 4% to 1%, $42/ton of sulfuric acid are required. To remove 90% of the sulfur content of flue gases by means of the cheapest process, $12.60/ton of the sulfuric acid removed is needed.

19192 *APTIC NO. 37610*

Ikeda, Otto M.

WHERE AIR POLLUTION CONTROL STANDS AS AN INDUSTRY. Preprint, Society of Manufacturing Engineers, Dearborn, Mich., 9p., 1970. (Presented at the Economics of Environmental Pollution Abatement, Creative Manufacturing Seminar, Detroit, Mich., Dec. 1-2, 1970, Paper MM70-611.)

Air pollution control represents a rapidly increasing segment of industry. Entries into the field are motivated principally by the direct profit potential, but they also relate to enhancing the prestige of the organization or developing talents for control of internal pollution problems. The new additions to the industry will encounter problems associated with the fact that the equipment is not sold to the ultimate beneficiary. Some questions on the size and the shape of the industry, incentives and responses, and pitfalls are considered. (Author summary modified)

19193 APTIC NO. 37669

Karsten, Detlev

ECONOMIC ASPECTS OF ENVIRONMENTAL PROTECTION. *(Volkswirtschaftliche Aspekte des Umweltschutzes). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, 155 (3):330-339, 1971. 9 refs. (Presented at the Anlass der Bad Godesberger Hygienetagung, 1971.)*

Industries, public bodies, and households are frequently in a position to curtail expenditures by dumping their refuse in the environment or by emitting untreated waste gases to the atmosphere. As a result, the community has to bear costs arising from private activities. When the costs to the community are greater than the expenditure saved privately, the efficiency of the economic production process is impaired. The impairment of efficiency has further consequences, in particular, a distortion of the price structure through the faulty distribution of costs, leading to the general misdirection of the economy. In a free-enterprise system, a politico-economic solution is offered by the principle of responsibility: if those responsible for polluting the environment had to pay for the resulting damage, they would have an incentive to avoid pollution. This principle can best be applied by making the polluter pay a sum equivalent to the estimated cost of the damage caused. The economic damage must be determined by a utilization-cost analysis; an institution for this purpose must be created. The execution of all measures is complicated by problems of cooperation between federal, land, and local authorities; by department isolationism; and by the necessity of agreement within the European Economic Community. General regulations must be framed so that they can be amended in the light of future knowledge concerning environmental pollution. When they are promulgated, regulations for a transitional period must also be drawn up. The rapid execution of all desirable measures will raise many financial problems, particularly for local government authorities.

19194 APTIC NO. 37409

Prescott, James H.

LEAD-FREE GAS: THE OPTIONS. *Chem. Eng., 79(4):32-34, Feb. 21, 1972.*

If the Federal government follows tht least demanding schedule (A) for removal of lead from gasoline, oil companies will have to invest at least $2 billion more by 1980, and motorists will be paying $6.5 billion more annually for gasoline. The most rapid rapid feasible schedule (L) would double the additional investment to $4 billion and force motorists to spend $8 billion more/yr. A 1%/yr higher growth rate in gasoline demand than the 2.8% projected would add $125 million/yr to schedule A and $150 million to schedule L. These estimates do not include the increasing capital investment costs for air and water pollution control on new and existing process units. For new units for lead-restriction schedules, control costs will range from $50-300 million by 1976.

19195 APTIC NO. 37734

Struth, Bert W.

THE IMPACT ON THE CPI OF REMOVING LEAD FROM GASOLINE. *Chem. Technol., 2(2):96-97, Feb. 1972.*

Although removal of lead from gasoline will affect the refining industry in predictable ways, its consequences will be felt by the chemical industry in ways that are not immediately obvious. The declining expansion rate of natural gas production will mean that petrochemical producers will have to consider alternative feedstocks to ethane and propane for future ethylene plant expansions. While higher liquid recoveries are anticipated, the costs for ethane and propane will increase. An inevitable increase in fuel gas prices above current levels is foreseen. Condensates, paraffinic raffinates from aromatic extraction, and light straight run naphthas will become more plentiful as lead is removed from gasoline. The demand for aromatics and alkylates in lead-free gasolines will put price pressures on these materials. The breakdowns of feedstocks and petrochemical production from steam crackers expected by 1980 are given.

19196 APTIC NO. 37336

Tanaka, T., S. Iijima, and M. Fujita

INVESTIGATION OF ORIGINAL UNIT OF ENVIRONMENT DISRUPTION. *(Kogai gentani chosa). Text in Japanes. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):189, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The production of pollutants was analyzed as a side-product of normal economic activity of production and consumption. The industry was classified into 43 categories of business, and original units were calculated. The product considered was oxides of sulfur (sulfur dioxide and trioxide). Costs are given for reducing the sulfur content in fuel, control equipment, and maintenance in the electric power and petroleum industry.

STANDARDS AND CRITERIA

19197 APTIC NO. 37472

THE SOUTH CENTRAL STATES: A DIVERSIFYING INDUSTRIAL ECONOMY SPAWNS POLLUTION PROBLEMS. *Ind. Develop., 140(6):13-25, Nov./Dec. 1971.*

Dozens of heavy industries, including steel mills, paper plants, and cement factories, have joined petrochemicals and food processing to bring a new image of diversification to the economy of the South Central states. To minimize pollution problems attending industrial development, Arkansas, Louisiana, Oklahoma, and Texas have each enacted programs to guard their air and water. The air and water quality standards in these states are given along with a summary of the tax incentives and low interest financing programs for pollution control equipment and facilities. Air quality standards are included for smoke shade, incinerator emissions, particulates, sulfur dioxide, dust fall, sulfuric acid mist and/or sulfur trioxide, carbon monoxide, oxidants, hydrocarbons, odor, hydrogen sulfide, hydrogen fluoride, sulfuric acid plants, steam generators, boilers, effective stack height, and nitric acid manufacturing.

19198 APTIC NO. 37624

Kaemper, H.

SHALL THE HEATING OIL STANDARDS BE EXPANDED. *(Sollten die Heizoelnormen erweitert werden). Text in German. Oel Gasfeuerung, no. 2:86-93, Feb. 1972.*

The density, point of combustion viscosity, carbon residues, point of solidification, sulfur content, water content, heating value, oxide ash, and sediments were standardized for fuel oils in Germany. In the U. S., there are 4 to 5 requirements which have to be met by fuel oils; the condition of oil firing systems is not of a lower quality. Of the ten requirements, only viscosity is of importance for mixture formation and thus for completeness of combustion as well as for soot formation. The sulfur content has been limited for fuel oil EL to 0.8% by weight and for fuel oil S to 2.8% by weight. No proof can yet be furnished that sulfur impairs the completeness of the combustion process. The oxides of sulfur are disadvantageous when sulfuric acid is formed on the cooler walls or when adsorbed sulfur oxides are emitted with the soot. The prevention of this lies in the hands of the plant manufacturer. The content of ash-forming substances may not exceed 0.01% by weight in fuel oil EL and 0.15% in fuel oil S. Such substances influence the combustion process in a positive way, according to newest findings, since finely distributed metal oxides promote oxidation. The solid alien substances in fuel oil EL have been limited to 0.05% by weight and for fuel oil S, to 0.5%. At this concentration, they hardly interfere with the combustion process. The existing standards provide little information on the combustion properties of fuel oil. Expensive research for further expansion of the standards does not seem justified; none of the other countries have so many limitations and so few kinds of fuel oils.

LEGAL AND ADMINISTRATIVE

19199 **APTIC NO. 36990**

Eidgenoessiche Kommission fuer Lufthygiene, Zurich (Switzerland)

AIR POLLUTION CONTROL PRINCIPLES FOR THE EVALUATION OF AIR POLLUTION PROBLEMS. ***(Die Reinhaltung der Luft. Grundsaetze zur Beurteilung lufthygienischer Probleme). Text in German. Bull. Eidgenoess. Gesundheitsamtes Beilage B, no. 2, 8p., March 14, 1970.***

The Air Pollution Commission of the Swiss Confederation has set down ten principles as guidelines for the evaluation of air pollution problems. The atmosphere must be kept as free of pollution as possible to protect public health, plant, and animal life. Where pollution cannot be avoided it must be kept within limits of sporadic nuisance and only insignificant damage can be tolerated. Air pollution evaluation should be based on a comparison with similar circumstances elsewhere where prevailing conditions are satisfactory. Maximum permissible levels for particulates are 200 mg/sq m/day for urban areas and 100 mg/sq m/day for rural areas; for sulfur dioxide, 0.01-0.12 cu cm/cu m depending on time of year and zone; for soot, 0.1-5.4 COH (coefficient of haze) units depending on time of year and zone. For pollution from specific stationary sources a similar source with the most modern control equipment should serve as a criterion for comparison. All emissions to the atmosphere must be kept to the minimum achievable by the best available technical means. All available measures must be taken by employers to protect the health of humans and of plant and animal life as stipulated by the Work Law. The technical and economic feasibility of such measures must be judged from comparison. This applies to all polluters, not only to those who come under the Work Law. All sources of pollution must gradually acquire the most effective pollution control equipment on the market.

19200 **APTIC NO. 37319**

THE INTERVIEW ON BURNING QUESTIONS: TECHNOLOGIES WHICH ARE FRIENDLY TO THE ENVIRONMENT. ***(Das aktuelle Interview, Umweltfreundliche Technik). Text in German. Umschau (Frankfurt), 71(26):979, Dec. 1971.***

In the environmental protection program of the Federal Government of West Germany, the term technologies friendly to the environment is frequently used. For an explanation of the meaning of this term, the head of the project group Umweltfreundliche Technik-Verfahren und Produkte (technologies - methods and products friendly to the environment), created within the Ministry for Education and Science, was interviewed. Technologies friendly to the environment are not limited to solely those which avoid a pollutant emission. First of all, limits of reasonable environmental pollution will have to be set. Reasonable environmental pollution does not mean total avoidance of pollution, but likewise it does not mean pollution to the threshold of the unbearable; it means something in between. In order to achieve this, present cleaning processes will have to be improved and processes which are cleaner will have to be developed. In each case, the economic aspect may not be overlooked. Whereas economy ranked utmost in the development of new processes in the past, it will now rank no higher than the environmental aspect. A list of priorities of subjects for research worked out by the newly created group, includes the elimination of sulfur dioxide from flue gases as well as fuel, the development of improved methods of continuous and automatic analysis of all emissions, and fine dust and odor elimination.

19201 **APTIC NO. 37392**

THE PROBLEM OF THE LEADED GASOLINE LAW. ***(Zur Problematik des Benzinbleigesetzes). Text in German. Erdoel Kohle (Hamburg), 24(9):605-606, Sept. 1971.***

A West German law of Aug. 8, 1971 that requires the maximum lead content in spark-ignition motor fuel to be 0.15 g/l as of 1976 is criticized. The reduced octane values would require new expensive refinery processes and modifications in motor designs, while used car engines would create a serious problem. Also fuel imports would be affected, despite the provisions of the law. A lead filter, equivalent in its effect with the law, is being developed by the Associated Octel Co. Ltd., London. This law does not rule out a common solution by the European Economic Community in the future. Experts of this organization found the fuel lead content of 0.4-0.45 g/l acceptable from a hygienic point of view. A further reduction of the lead content as envisaged for 1976 might even increase dangers due to increased amounts of aromatic compounds in gasoline.

19202 **APTIC NO. 37397**

AIR POLLUTION. ***(Inguinamento atmosferico). Text in Italian. Ind. Mec., 23(244):405-407, July-Aug. 1971.***

Regulations are discussed which are charged with the fixing of maximal permissible emission levels of atmospheric pollutants along guidelines issued by the Regional Committees, and with the enforcement of this regulation. The regulation contains information on general norms, abatement plans, construction, enlargement and modifications of industrial plants, supervision and on-site inspection, maximal permissible emission concentrations, and temporary standards-final dispositions. The Survey Service is charged with sample taking and measurement of pollution levels by means of standardized equipment which is stipulated in 13 supplements. Technical procedures and standardized sampling are described for various pollutants. Regulations were also passed for emissions for diesel engines. The regulations stipulated the limits of opacity of smoke emitted by various types of vehicles. New buses for urban transport must not exceed 45% of the norms, all other new vehicles 50%. Maximal emissions for old vehicles are 65 and 70%. This order applies to all types of diesel engines, whether used for transport, agriculture, or construction.

19203 **APTIC NO. 37441**

THE QUESTION OF DUST EMISSION CUSTOMARY TO A LOCATION. ***(Zur frage der Ortsubeblichkeit von Staubeinwirkugen). Text in German. Bituman-Teere-Asphalte-Peche, 23(1):27, Jan. 1972.***

According to paragraph 906 of the Federal Law (Bundesgesetzblatt) in West Germany, indemnity can be demanded if dust effects a neighboring plot. Such rights cannot be exerted when the whole area is exposed to dust emissions which are customary for the area. This was not determined by the federal court in January 1971. The case involved dust emission by a gravel quarry which was located in the vicinity of homes in an industrial area.

19204 APTIC NO. 37445

INDUSTRY AND AUTHORITIES COOPERATING IN AIR POLLUTION REGULATION AND MONITORING IN THE ROTTERDAM AREA. *(Luftforurensninger overvakes og reguleres ved samarbeide mellom industri og myndigheter i Rotterdam-omradet). Text in Norwegian. Tidsskr. Kjemi Bergvesen Met., 31(9):15-18, Nov. 11, 1971.*

Permanent air pollution monitoring is carried out by an alarm station in the Rotterdam area, consisting of a network of 31 control units. Subjective opinions on air pollution are received by phone from the inhabitants. Sulfur dioxide measurement data are transmitted from the control units in every minute to a central computer where the hourly averages are computed. By eliminating systematic factors (time of day, and wind direction) data are obtained which are compared to the respective standard values for the sensors. When the specific threshold value of a sensor is exceeded an internal alarm is delivered by the computer; external alarm is given through a Semaphone system if the excessively high value lasts for the next 6 hr. Then all activities susceptible to increase air pollution are stopped, and plants are forced to reduce their operation intensity. The sulfur dioxide concentrations are automatically measured by the sensors by means of coulometric bromine titration, in determining redox potentials against a reference voltage. With bromine concentration constant, the signals transmitted are in proportion to the actual sulfur dioxide concentration. Calibration is also made automatically.

19205 APTIC NO. 37456

JAPAN AND THE POLLUTION PROBLEM. *(Giappone e il problema dell inquinamento). Text in Italian. Inquinamento, 13(9):32-39, Nov. 1971.*

Pollution from petroleum fuels in Japan has doubled from 1962 to 1967. This pollution consists of 48% carbon monoxide, 30% sulfur oxides, 10% nitrogen oxides, 10% hydrocarbons, and about 2% particulates. The sulfur dioxide pollution level is higher in Japan than in any other country. The basis of pollution control is the law of Aug. 1967 designed to protect public health from all types of pollutants. Subsequently, supplemental laws were passed, the last 14 in Nov. 1970 dealt with basic pollutants, noise, odors, street traffic, sewage, agricultural chemicals, natural parks, toxic substances, sea water pollutants, solid waste, cost of pollution control, and fines for polluters. Of particular interest to the power industry are maximal permissible emission limits for SO2 and particulates. Sulfur dioxide concentrations must not exceed 0.2 ppm in 99% of 8760 hr during 1 yr, 0.1 ppm in 88% of 8760 hr/yr, and 0.05 ppm in 70% of 8760 hr/yr. In a heavily polluted area, the SO2 concentration has to be reduced to 0.25-0.30 ppm within 5 yrs and to stipulated levels within 10 yrs. The maximal permissible levels for particulates are 100 micrograms over 24 consecutive hours or 200 micrograms in any hour. In July 1970 a Board was created under the direction of a cabinet minister with the power to coordinate the activities of all committees and authorities dealing with pollution. Currently 13 pollution monitoring networks are in operation in major cities with seven more to be established. Pollution control measures adopted by the electrical power industry, the introduction of low sulfur fuels, pollution control equipment, dust control equipment, operational measures designed to reduce pollution and the current state of studies and research dealing with pollution are reviewed.

19206 APTIC NO. 37500

FEDERAL CONTROL OF EMISSIONS ENDS WITH SALE OF NEW AUTOS. *Water Pollution Control (Toronto), vol.110:47-48, Feb. 1972.*

The first priority of the Federal automobile program is to check new cars for compliance with current emission standards. The 1971 regulations require a 100% reduction in crankcase emission, 75% in carbon monoxide, and 67% in hydrocarbon emissions. The Ministry of Transport chooses a representative sample of all the makes and models of motor vehicles imported into or made in Canada. This sample is then tested for compliance with the emission standards by the Air Pollution Control Directorate. Test procedures for light and heavy-duty vehicles are described. The main emission control systems for gasoline engines now in use are listed.

19207 APTIC NO. 37560

RETROSPECT ONTO TECHNICS AND RESEARCH 1971. *(Rueckblick auf Technik und Forschung 1971). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(52):1-2, Dec. 29, 1971*

Progress has been made in the Federal Republic of Germany in 1971 with regard to dedusting. Dedusting equipment is used in nearly every branch of industry, so that the dust load in the air has decreased. Great problems however are caused by air pollution like sulfur dioxide, carbon monoxide, and nitrogen oxides. Gas washing methods for SO2 are still in a state of experimentation and the refineries are opposed to a desulfurization of the fuel because of costs. The reduction of CO and NOx is similarly difficult. The main producer of these harmful gasses is the car motor. A concentration of CO and NOx which is harmful to human health is reached and even exceeded in rush hours of densely populated cities. A limitation of CO in exhaust gas has been in effect since Oct. 1971, however, there is none for NOx. In Aug. 1971 a gasoline-lead act became effective which provides a reduction of the toxic metal organic lead additives. Another law against air pollution, the emissions protection law, is in preparation.

19208 APTIC NO. 37641

THE FIGHT AGAINST AIR POLLUTION IN GREAT BRITAIN. *(Contro l inquinamento ambientale in Gran Bretagna). Text in Italian. Ingegneria (Italy), no. 10:653-655, Oct. 1971.*

An outline of the pollution problem in England is given. Factors which will influence the situation in the future, and a list of priorities which should govern all future actions dealing with pollution control are discussed. Population growth is not a crucial problem in Great Britain. However, the concentration of the population in cities and in some geographic areas and the rising per capita production is a problem. Production will double in 30 yrs with concomitant environmental deterioration. The Clean Air Act of 1956 was successful in that it, for example, doubled sunlight in winter in London by 50% in spite of a 10% population increase and a 17% energy consumption increase. High priority is given to an inquiry into the pollution of coastal waters of Great Britain. Recent government measures by the Secretary for the Environment concern the limitation of the size of trucks, effluents from potash plants, disposal of cinders from furnaces, automobile emissions, and noise control. Solid waste disposal, radioactivity, and water pollution are mentioned.

19209 APTIC NO. 37719

THE CONSTRUCTION OF APARTMENT BUILDINGS WITH PROTECTION AGAINST EMISSIONS. *(Wohunngsbau in immissionsfeindlicher Konzeption). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(50):16, Dec. 1971.*

In the Oslebshausen district in the city of Bremen, new apartment buildings will be constructed in the immediate vicinity of large industrial complexes and railroad tracks heavily frequented by freight trains. Moreover, an oil refinery is very close to the construction site. The buildings comprise 430 units. The construction of these buildings help provide an answer as to whether noise and emissions can be eliminated through construction. The apartments are meant for the workers in the nearby plants. They can reach their working place on foot and need no transportation. The buildings are fenced in by a specially designed eight-story high building which performs a double function: it shields off the other buildings against the industries, and it contains apartments which are designed according to stringent protection requirements.

19210 APTIC NO. 37725

AT TOO MUCH DIRT IN THE AIR: PRODUCTION STOP. *(Zuviel Schmutz in der Luft: Produktionsstop). Text in German. Technica, 20)26):2597, Dec. 1971.*

If air pollution becomes too great because of unfavorable weather conditions, industrial enterprises in the U. S. must deal with the temporary reduction or halt of production. This happended for the first time in Birmingham, Alabama on Nov. 18, 1971. According to the ruling of a district judge, 23 industries with 25000 employees were ordered to reduce or halt their operation. A temperature inversion had caused a dangerous concentration of air pollution on the ground level. The maximum allowable pollutant concentration of 375 micrograms/cu m had risen within one week to more than twice this amount (771 micrograms/cu m). The legal basis for such actions is provided by the law concerning air pollution which became effective Dec. 31, 1970. In a similar situation, Pittsburgh advised 29 enterprises to reduce the emission of waste air. In New York, where the sunlight-index decreased to 12 (normally 40, maximum 50), car drivers were requested to abstain from using their cars.

19211 APTIC NO. 37760

POLLUTION-CONTROL LEGISLATION IN THE UNITED KINGDOM. *Iron Steel, 44(6):467-468, Dec. 1971. 2 refs.*

In the United Kingdom, air pollution from iron- and steelworks is controlled by the Alkali Works Regulation Act, 1906, and the Clean Air Acts, 1956 and 1968. The Alkali Act is enforced by the Alkali Inspectorate, which supervises those processes in which the emissions arise mainly from chemical or physical changes in the reacting materials or which present special control problems. Enforcement of the Clean Air Acts is the responsibility of local authorities, who control processes in which the emissions arise mainly from the combustion of fuels. Legislation controlling disposal of industrial liquid effluent into bodies of water is discussed.

19212 APTIC NO. 37074

Baskerville, Charles

LEGAL STATUS OF WORKS PRODUCING NOXIOUS GASES. *Eng. Mining J., vol. 87:884-887, May 1, 1909. 47 refs.*

The question of what degree of impurity imparted to the atmosphere by an individual in the use of his property constitutes a nuisance is one of fact, and is determined by the jury from the circumstances of each case. The character and nature of the gas complained of is of prime importance, and the times and periods of the generation of the gas, or the constancy and frequency of the annoyance, the extent of the injury or inconvenience caused, and the nature of the business, its location, management and manner of construction, must all be carefully considered. Several decisions relating to odors and smoke and noxious gases from a smelting works are described. Cases of federal jurisdiction, foreign legislation, popular misconceptions, and the use of an expert board to assess damages are discussed.

19213 APTIC NO. 37670

Beckert, Johannes

PROCESS OF OPTIMIZATION IN URBAN AND HOUSING HYGIENE, ILLUSTRATED BY PLANNING OF THE OLYMPIC VILLAGE IN MUNICH. *(Optimierungsverfahren fuer die Staedte-und Wohnungshygiene, dargestellt am Beispiel der Planung des Olympischen Dorfes in Muenchen). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(2):39-48, Feb. 1972. 19 refs.*

Numerous plans stage the beginning of Multi-stage optimization of large scale building projects; those plans with the most disadvantages are eliminated at each stage of optimization. The plans are tested according to criteria established by specialists from various fields and are evaluated by a point system. The optimization is consequently a process by which the best solution results from an ever decreasing number of alternatives. The requirements and scale of evaluation are given for the Olympic Village in Munich, including the prevention of any accumulation of automobile exhaust gases through dense, slow traffic, cold starts, low turbulence, and reduced vertical flow (buoyancy), e.g., parking lot arrangements so that there is always enough ventilation. The planting of trees is important to reduce dust. Measurements have shown that the air in streets with trees contain only one third as much dust particles as the air in the center of the city with no trees.

19214 APTIC NO. 37538

Betz, Gordon M.

NOW ENVIRONMENTAL LAW CAN HELP YOU. *Plant Operating Management, 89(6):36-38, Dec. 1971.*

Four recent landmark court decisions involving air and water pollution problems are summarized. The cases illustrate some of the basic legal principles bearing on adjudication of the economic, social, and technical conflicts caused by efforts to improve the environment. They also indicate the nature of future technological requirements.

19215 APTIC NO. 37338

Birthler, Richard

THE DEVELOPMENT OF THE MINERAL OIL INDUSTRY IN THE GERMAN DEMOCRATIC REPUBLIC. *(Zur Entwicklung der Mineraloelindustrie in der DDR). Text in German. Wasserwirt. - Wassertech., 22(1):1-3, Jan. 1972. 12 refs. (Presented at the Verhuetung und Bekaempfung von Dlhauarien Symposium, 2nd.)*

Within the period 1971 to 1975 the quantity of mineral oil refined in the German Democratic Republic will rise from 10.6 million tons to 18 to 19 million tons. Also the annual mineral gas mining will experience a rapid rise to 11.5 billion cu m. This expansion of the mineral oil industry may take place only when any harmful effect on the environment can be prevented. In order to avoid air pollution by refineries, a network monitoring the sulfur dioxide emissions must be set up. Each measuring station analyzes hourly 60 air samples and reports the results together with the wind direction and the wind strength automatically to the data center. If the limit concentration is exceeded, an alarm is released. The refinery then initiates measures which reduce the SO2 emission. Such measures include a switch to desulfurized heating gases. Many years of experience in the Swedish refinery in Goeteborg have shown that by this method an average concentration of 3 to 5 pphm/hr SO2 can be maintained over a long period of time.

19216 APTIC NO. 37052

Burton, Ellison S. and William Sanjour

MULTIPLE SOURCE ANALYSIS OF AIR POLLUTION ABATEMENT STRATEGIES. *Va. Polytech. Inst. Water Resour. Res. Center Bull., no. 26: 209-229, Oct. 1969. 2 refs.*

NTIS: PB 195424

Five factors in particular affect the feasibility of an abatement strategy: the phasing of mandated emission reductions; the source-by-source costs of emission control options and their economic burden on the sources required to reduce emissions; the effect of individual emission controls on local and regional air quality; the control agency resources required to enforce an abatement program; and the political acceptability of the controls mandated. An approach to air pollution abatement planning is described which can provide most of the detailed cost-effectiveness estimates needed to evaluate these five factors. The primary basis for evaluating a candidate strategy is the least-cost strategy for achieving stated air quality goals, defined in terms of emissions or concentrations of the pollutant of interest. Interrelated computer programs, data files, and special techniques are utilized to simulate the source-by-source control of air pollution in a geographic area so that any number of prospective abatement strategies can be compared for cost and effectiveness. This approach has been applied to Kansas City, Kansas-Missouri, and to Washington, D. C.

19217 APTIC NO. 37144

Degler, Stanley E. and Sandra C. Bloom

FEDERAL POLLUTION CONTROL PROGRAMS: WATER, AIR, AND SOLID WASTES. *Bureau of National Affairs, Inc., Washington, D. C., 1970, 111p.*

A detailed discussion is presented of existing federal spending, research, and enforcement programs for air, water, and solid wastes, a discussion of legislation unfinished by the 90th Congress, and a look at what the future may hold. Information on the water quality standards, the water and air enforcement programs, and the text of relevant federal laws are provided. Costs are cited.

19218 APTIC NO. 373930

Delorenzi, Enzo

THE ACTION OF MUNICIPAL HYGIENE OFFICES AGAINST SMOG. *(L azione degli Uffici d Igiene Comunali contro lo smog). Text in Italian. Audiotecnica News, no. 1-6:136-148, Jan.-Dec. 1971. (Presented at the Congresso Nazonale per la lotta contro fumi e rumori, Genova-Nervi, July 9-12, 1958.)*

It is impossible to fight air pollution without considering meteorological factors like precipitation, fog, wind direction and velocity, and the effects that the layout of cities and their construction in general have on these factors. Properly equipped meteorological stations must form part of every pollution control system and macro and microclimate must be studied before any action can be taken. The second step of an action plan is taking inventory of pollution sources, the third is the establishment of a monitoring network for the periodic or continuous measurement of dust fall, of smoke, sulfur dioxide, and other pollutants. The equipment available to the Health Department of the city of Turin is a completely equipped meteorological station, air sampling and measuring equipment for SO2, hydrocarbons, hydrocyanic acid, hydrogen sulfide, carbon monoxide, benzene, carbon disulfide, and trichloroethhylene, equipment for the determination of smoke opacity, and Geiger counters for the detection and determination of atmospheric radioactivity. A smoke squad consisting of trained personnel expert in the handling of measurement instruments is helpful in major cities. The means available for the control of pollution include legislation designed to protect public health which can be applied to all possible emission sources, educating and alerting the public by radio and television, an inspection system of domestic heating installations and industrial emission sources, and not only local but regional planning of pollution control. Prevention of pollution should always take precedence over control because all purification equipment is imperfect and subject to malfunction and breakdowns.

19219 APTIC NO. 37633

Donagi, A. and J. Kendler

ENVIRONMENTAL HEALTH PROBLEMS IN ISRAEL. *(Boyoth Briuth Ha Svivah VMino-oth Myupegaim BYisrael). Text in Hebrew. Harefuah (J. Israel Med. Assoc.), 81(7):335-339, 352, Oct. 1, 1971. 15 refs.*

Air and water pollution and other environmental health problems in Israel are discussed. Most Israel rivers and water resources are highly polluted. Industrial wastes have killed almost all living organisms in the Hadera and Kishon rivers and caused a considerable decrease in the fish population of the Alexander and Soreq rivers. Salt water has penetrated many drinking water wells, mostly in the Emek Hefer region, rendering some aquifiers temporarily unusable. The infiltration of sewage has caused a shutdown of underground drilling wells in the Jerusalem areas, and concentrations of DDT and other insecticides are increasing in Lake Kinneret. The increased rate of urbanization and the shortage of land has resulted in population congestion and a need for new approaches to the problems of waste disposal. Creation of intermunicipal federations for sewage and solid waste disposal, such as the Dan region federations, is a step toward this goal. Considerable progress has been made in the field of air pollution. An air pollution monitoring network has been established in Tel Aviv and similar ones are planned for Ashdod and Haifa. A comprehensive countrywide plan for air-pollution abatement was recently completed. Much remains to be done in the fields of legislation, measurement, and abatement. Recommendations for the necessary steps to be taken are made.

19220 APTIC NO. 37009

Dreyhaupt, F. J.

ORGANIZATION AND EFFORTS OF GOVERNMENT OFFICES FOR THE PRELIMINARY STEPS AND PERFORMANCE OF AIR POLLUTION CONTROL. *International Union of Air Pollution Prevention Associations and National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 269-272. (Oct. 4-7, Paper VIII/4.)*

The administration and legislation fostered by the government of North Rhine Westphalia to control air pollution and establish air quality standards are reviewed. The work of approximately 500 officials of the Inspectorate in executing control measures and improvement programs for steel converters, cement works, power plants, and potteries is described. Measures to restrict emissions from industrial and domestic sources and waste incinerators are discussed along with techniques for preventing smogs. Emergency procedures in case of severe air pollution episodes are outlined.

19221 APTIC NO. 37717

Engelkes, G.

DECONTAMINATION OF WASTE GASES IN SWEDEN. *(Abgasentgiftung in Schweden). Text in German. Gesundheitsw. Desinfekt. (Hamburg), 63(11):172-173, Nov. 1971.*

Since 1969, decontamination of gasoline has been in progress in Sweden by means of a gradual reduction of its lead content. Within the next few years, the use of gas with any lead content at all will become illegal. By 1972, all new motor vehicles have to be equipped with a purification device for engine exhaust gases. All other, older cars are being checked once a year for the correct setting of carburetors to ensure the highest possible degree of combustion. Drivers are obligated to shut down the engine after three minutes of idle running. This regulation could result in a problem for taxis and buses, considering the discomfort which shutting off the heating system can bring about for drivers and passengers. For this reason, taxi stations, bus stops, and bus terminals are electrically heated, so that heated air can be conveyed from there to the inside of the vehicles. As part of official inspection procedure in Sweden, a certain apparatus is inserted into the exhaust pipe for determination of the composition of the waste gases. If unsatisfactory conditions are found, they have to be attended to and the car has then to be presented again for inspection. Injection pumps for diesel engines must be set so that the exhaust gas conditions remain tolerable even at maximum load. The law prescribes that the pump has to be sealed by the work shop or service garage after setting.

19222 APTIC NO. 37534

Garcia Lara, M. A.

UNIFICATION OF POLITICAL AGENCIES OF CONTROL AND ELIMINATION OF POLLUTION. *(Unificacion de politicas de control y eliminacion de contaminaciones). Text in Spanish. Asoc. Mex. Tec. Ind. Celul. Pap. (Bol.), 10(5):391-392, Sept.-Oct. 1970.*

Air pollution, a problem affecting large industrial cities throughout the world, has increased considerably in Mexico during the last few years. Contaminant controls could be enforced if the different organizations that study the problem develop a strict program including corrective steps.

19223 APTIC NO. 37109

Gruber, Charles W.

ODOR POLLUTION FROM THE OFFICIAL S VIEWPOINT. *Am. Soc. Testing Mater. Spec. Tech. Publ., no. 164:56-68, 1954. 1 ref. (Presented at the American Society for Testing Materials, Annual Meeting, 57th, Chicago, Ill., June 15, 1954.)*

The perplexity of the outdoor pollution problem and the difficulty encountered by the official in dealing with industry and the public in this matter are discussed. A situation can be very difficult to analyze, e.g., when the offending source is a one or two-batch process from among many, or when different materials processed through the same equipment result in foul-smelling discharges one time and unobjectionable emissions another, catching or missing weather conditions to cause odor build-up without pattern or cyclic recurrences. When process operators receive a call about an odor situation, they can change the process a little and they deny all responsibility for the odor source and defy the official to determine its source and its cause. Several case histories are cited which underline the need for odor monitoring equipment. Odor description and measurement methods are considered.

19224 APTIC NO. 37637

Hammel, Hans

HESSIAN INSTITUTE FOR ENVIRONMENT. *(Hessische Landesanstalt fuer Umwelt). Text in German. Muell Abfall, 4(1):25-26, Jan. 1972.*

In order to solve the environment problems, the Hessian Institute for Environment was founded with work groups for water protection, refuse removal, emission protection, and environmental development planning. A special department for measurements controls and examines the data transmitted from control stations for radioactivity, smog concentration, and water pollution. In Oct. 1971 the first smog warning plan came into effect which provides the limitation of traffic and consumption of fuel containing sulfur.

19225 APTIC NO. 36944

Henz, Donald J.

CONTROL STRATEGIES FOR SET II POLLUTANTS KANSAS CITY IAQCR AND S. CENTRAL KANSAS AQCR. FINAL REPORT. *PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio, Environmental Protection Agency Contract 68-02-0044, Task 4, 39p., Dec. 28, 1971. 4 refs.*

Control strategies for a number of pollutants in the South Central Kansas Air Quality Control Region and the Kansas City Interstate Air Quality Control Region are summarized. The methodology used in calculating the emissions required to meet the Federal Ambient Air Quality Standards is attached, as well as the rational for determining control rates, industrial growth rates, and motor vehicle emission rates. Air quality standards, existing measured concentrations, emissions after application of the Federal Motor Vehicle Program, and application of any additional control measures are indicated for carbon monoxide, oxidants, and nitrogen oxides. Control strategies for particulates, sulfur oxides, and hydrocarbons are also considered.

19226 APTIC NO. 37758

Johnson, D.

THE INDUSTRY AND THE ENVIRONMENT. *Iron Steel, 44(6):449-452, Dec. 1971.*

Pollution laws and regulations in Japan and Sweden, and the responsibilities of the environmental control agencies in those countries, are discussed. In most developed countries, industry is being forced to take abatement action in response to public demand and not through economic or technical considerations. The net effect of the public demand for a cleaner environment is very strict legislation on all kinds of pollution, including noise. In The Netherlands, public opposition prevented the construction of a new integrated steelworks, despite evidence that emissions from the plant would be within reasonable limits. In the United States, a steel company that has spent $100 million for control equipment was charged with pollution at two locations. The gross air pollution problems caused by steelmaking, i.e., red smoke, push technology to the limit. Presently available bag houses, wet scrubbers, or electrostatic precipitators meet an effluent standard of 0.05 gr/cu sft and provide 95-98% removal efficiency. However, an efficiency between 99.6-99.99% will be required to reach a standard of 0.01 gr/cu sft, or not more than 40 lb/hr, as proposed in the United States. Such a level is probably not not obtainable with present equipment.

19227 APTIC NO. 37061

Kerr, George A.

HUMAN ENVIRONMENT. *Preprint, Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), 6p., 1970. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May, 31-June 3, 1970, Paper ICTFC-NAFTC-1.)*

Administrative measures to reduce air pollution in Ontario are outlined. These include restrictions on the sulfur content of fuels used in urban areas, particularly Toronto; a network of air quality monitoring stations; a pollution Index and Alert System; auto exhaust emission standards; and mandatory control devices in new cars.

19228 APTIC NO. 37597

Kester, Bruce E., J. L. Gilliland, Stewart S. Fritts, Zeb G. Bell, Jr., Hubert Smith, and Richard H. Berby

ENVIRONMENTAL CONTROL SYMPOSIUM. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Ind. Appl., 1A-8(1):8-17, Jan./Feb. 1972. (Presented. 1972. (Presented at the Institute of Electrical and Electronic Engineers, Cement Industry Technical Conference, Seattle, Wash., May 11, 1971, Paper TOD-71-53 A-E.)*

The problems of environmental controls with particular application to the cement industry, abatement legislation, and control methods are reviewed. Creation of the Environmental Protection Agency has not decreased the problem. The major distortions lie in the semantics of measurements, the threshold limit value, and the limited and often ineffective methods of measurement and analysis. The provisions of the Clean Air Act of 1967 which apply to the control of stationary sources are considered. Primary and secondary air quality standards for sulfur oxides, particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide and associated criteria are discussed. Control equipment for use in the various processes of the cement industry is reviewed, including electrostatic precipitators and fiber filter bag collectors. Some dust collector application experiences are discussed.

19229 APTIC NO. 37063

Lameyre, G. and M. Fournier

PRACTICAL MEASURES IN THE FIGHT AGAINST AIR POLLUTION IN PARIS. *(Mesures pratiques dans la lutte contre la pollution atmospherique a Paris). Text in French. International Union of Air Pollution Prevention Associations and National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 285-286. (Oct. 4-7.)*

One of the important causes of air pollution in large towns is the release of smoke, visible or not, from domestic heating. French legislation, as well as practical measures taken in Paris in this sphere, tend on one hand to find the most adaptable fuel with the lowest sulfur content, and on the other hand to assure correctly balanced combustion. Municipal inspectors make tests in the boilerhouses themselves, while the city also equips a center to measure particles emissions. The Hygiene Service of the Housing Department has collected a large amount of information available for manufacturers and others. (Author abstract modified)

19230 APTIC NO. 37348

Lawyer, R. E. and C. G. Beard, II

WEST VIRGINIA S NEW CONCEPT IN REGULATING PARTICULATE MATTER FROM MANUFACTURING PROCESS. *J. Air Pollution Control Assoc., 22(2): 96-99, Feb. 1972. (Presented at the Air Pollution Control Association Meeting, Annual, 64th, Atlantic City, N. J., Paper 71-18.)*

The regulation (Regulation VII) limiting the emission of solid and liquid particulate matter from manufacturing processes in West Virginia is based on a modified process weight standard. The modification is manifested in a duplicate source concept with several allowable emission rate curves for different industrial categories rather than the conventional unit approach with a single curve. Any combination of like units within a plant is defined as a duplicate source, and the combined process weight of all units comprising a duplicate source is used to enter the process weight table for determination of the total allowable emission from all such units. The allowable emission rate from each individual unit is then determined by prorating the total emission by the appropriate process weight ratios. To avoid undue restrictions on industrial growth, the regulation includes an expansion formula for determining the emission rate for a new addition to a controlled existing plant. The duplicate source concept is expected to minimize the economic inequity between competing industries with regard to air pollution control.

19231 APTIC NO. 37307

Lewin, Joseph D.

NEW YORK CITY POWER AND POLLUTION ILLS: A PROFESSIONAL ENGINEER COMMITTEE RX. *Prof. Eng., 1972:28-30, Feb. 1972.*

An independent committee of professional engineers condusted a 2-year study of electric power and pollution problems in New York City. Recommendations arrived at by the committee included the need for better natural ventilation of new buildings, conservative use of central air-conditioning, utilization of waste heat, and reexamination of rate structures. These measures would help to conserve energy and restrict demand. The committee also urged the development of cluster housing with central heating and air-conditioning capability; the planting of trees and protection of existing trees to promote the natural regeneration of the air; and the adoption of control equipment such as hydro precipitrol devices which wash and clean all gases and, at the same time, remove particulate matter. Additional recommendations concerned the need to prohibit burning of fossil fuels within the city to supply pump storage power plants and the need to publicize the fact that low-sulfur fuels results in a greater emission of soot.

19232 APTIC NO. 37410

Otto, Franz

CONSTRUCTION OF A REFUSE COMPOSTING PLANT AGAINST THE RESISTANCE OF THE NEIGHBORS. *(Die Einrichtung eines Muellkompostwerkes gegen den Widerstand der Nachbarn). Text in German. Muell Abfall, 4(1):31-32, Jan. 1972.*

The administrative court Baden-Wuertemberg ruled that a refuse composting plant with incineration can be constructed by the city against the resistance of the neighbors who protested because of air pollution by burning polyvinylchloride contained in the refuse. The developing hydrochloric acid would have no harmful effect on human health. The administrative court rejected the claim of the neighbors. Stating that the planned method to dispose of the refuse was the best one, considering that an open dump would be even more dangerous to human health and that removing the refuse by sanitary landfill was not possible owing to the critical space situation of the city. Since the incineration plant would be equipped with a chimney of 80 m, the quantity of hydrochloric acid emitted into the air would be so small that dangers to health could be ruled out.

19233 APTIC NO. 37532

Paulus, Harold J.

CONTROLLING AIR QUALITY. *Univ. Med. Bull., 42(5):18-20, May-June 1971.*

The air pollution problem on the East Coast is acute at the present time with a good probability of a threatening disaster; other areas in the country that may be considered today as serious air pollution locations include Metropolitan Chicago, Buffalo-Niagara Falls, Seattle-Puget Sound, and Denver. Increasing concern on the part of the Federal government and the Clean Air Acts are mentioned. The Public Health Service has been assigned the task of dividing the country into air pollution control regions and to work out criteria for the many air pollutants. Based on these criteria, air quality standards could then be adopted and air pollution regulations could be set on a sensible and reasonable basis. With reasonably flat terrain and favorable meteorological conditions, the potential for a serious air pollution situation in Minnesota is much less than in other areas. Air quality standards and air pollution regulations have been adopted for the State of Minnesota. The six regions of Minnesota include 24 sampling locations. Air quality standards have been set on the visible pollutants by way of settleable solids, suspended solids, 0and soiling index. Standards have also been set on sulfur dioxide and the oxidants. Regulations concerning open burning are mentioned.

19234 APTIC NO. 37754

Poujade, Robert

AUTOMOBILES AND NUISANCES: A PROGRAM OF ACTION. *(Automobiles et nuisances: Pour un programme d action). Text in French. Pollut. Atmos. (Paris), 13(51):223-228, July-Sept. 1971.*

Current and future problems of automotive emissions were studied, and related regulations were proposed by a workgroup. The air quality standards suggested that the carbon monoxide threshold for 1 hr (40 ppm) and for 8 hr (15 ppm) should not be exceeded for more than 1% and 15% of the time. The threshold concentration of nitrogen oxides for 1 hr (0.25 ppm) should not be exceeded more then 1% of the time. Increasing carbon monoxide and hydrocarbons exhaust content is allowed with increasing vehicle weight. These values have been reduced since 1960, with the nitrogen oxides content unaltered. A total of 14,400,000 vehicles were operated in France in 1970, and an increase of 70% can be expected for 1985. A decrease of 40% air pollution is expected. The investments of research to reduce pollution by classical motors will amount to 8-10 million dollars. A resolution for the gaseous pollutants from spark ignition engines, in uniformity with the regulation by the European Economic Community will become effective in 1972. In an investigation in Paris of the carbon monoxide emissions by automobiles, in the period from April 1 to June 30, 1971, the 40 ppm threshold was exceeded in 20 of 3994 cases. Also the 15 ppm threshold was considerably exceeded. The costs caused to public health in Italy by pollution were estimated in 1968. The damages caused by water and air pollution to nature and buildings were evaluated to $75 million for the same year. The erosion of 50,000 sq km equaling 1/6 of Italy s territory entailed a damage of $4.8 billion dollars to agriculture.

19235 APTIC NO. 37499

Reynolds, F.

CURRENT CLEAN AIR LEGISLATION AND ITS APPLICATION TO INDUSTRIAL EMISSIONS. *J. Inst. Public Health Engrs., vol. 71:29-60, Jan. 1972. 54 refs.*

The responsibility for pollution control and enforcement in the United Kingdom is considered, as well as the air pollution control legislation. Provisions relating to smoke emission are presented, including the control of chimney heights and sulfur dioxide emissions. The control of grit, dust, and fume emissions are discussed, as well as miscellaneous provisions of the Clean Air Acts of 1956 and 1968. The control of emissions from Alkali Act registered processes is cited. Radioactive effluents are also mentioned.

19236 APTIC NO. 37259

Ruckelshaus, William D.

TITLE 40--PRETECTION OF ENVIRONMENT. CHAPTER I -- ENVIRONMENTAL PROTECTION AGENCY. PART 85 -- CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND MOTOR VEHICLE ENGINES. STATUS OF REGULATIONS FOR CERTAIN MODEL YEARS. *Federal Register, 37(12):784-785, Jan. 19, 1972.*

Federal regulations applicable to 1972, 1973, and 1974 model vehicles are indexed. The regulations are those appearing in the 45 Code of Federal Regulations Part 1201, as amended and redesignated 40 CFR Part 85.

19237 APTIC NO. 37423

Ruckelshaus, William D.

ENVIRONMENTAL PROTECTION AGENCY. (40 CRF PART 80). REGULATION OF FUELS AND FUEL ADDITIVES. LEAD AND PHOSPHORUS ADDITIVES IN MOTOR VEHICLE GASOLINE. *Federal Register, 37(36):3882-3884, Feb. 23, 1972. 3 refs.*

The Environmental Protection Agency has determined that emission products from lead and phosphorus additives will significantly impair the performance of emission control systems, including catalytic converters, being developed to meet the 1975-1976 motor vehicle emission standards. To provide for the availability of essential lead and phosphorus-free gasolines by 1975, the EPA proposes to regulate the lead and phosphorus content of regular and premium gasolines, beginning Jan. 1974. The proposed regulations are presented as a new Part 80 to be added to Title 40 of the Code of Federal Regulations. The regulations are divided into two parts, one containing general provisions and the other the controls applicable to gasoline refiners, distributors, and retailers and to motor vehicle manufacturers. The liability for violations is outlined.

19238 APTIC NO. 37386

Sander, Rudi

INDUSTRIAL SUPERVISION MEANS PROTECTION AT THE WORKING PLACE AND ENVIRONMENTAL PROTECTION. *(Gewerbeaufsicht equals Arbeitsschutz + Umweltschutz). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(1):1-7, Jan. 1972.*

Protection against emissions, the major concern of environmental protection, engages the industrial supervisory body more and more from year to year. Since there is a shortage of personnel this goes at the cost of the protection of working places. In view of the present difficulties to take care of all tasks, it is hardly imaginable how all those arising through the enactment of the emission protection law in 1972 shall be fulfilled. A long as there are better paid positions available elsewhere for qualified personnel the shortage will prevail.

19239 APTIC NO. 37497

Saylor, Louis F.

PUBLIC HEALTH REPORT. *Calif. Med., 115(1):106-107, July 1971. 5 refs.*

Since 1954 the California Dept. of Public Health has conducted research on the effects of air pollution on health, and the application of such research to determine what upper limits need to be imposed on pollutants to protect the health. The first scientifically supported air quality standards in the nation were developed by the department in 1959. Among other health reactions, the effects of oxidants on asthma and lung function were investigated, as well as research on the body burdens of lead and carbon monoxide. However, technology alone without significant changes in our mode of life will not provide air of sufficient purity to avoid deleterious effects on health. Long range community planning is needed, as well as air pollution health warning systems and continuing research.

19240 APTIC NO. 37292

Shigenari, Hiroshi

THE FINANCING SYSTEM PROVIDING FUNDS FOR THE PROTECTION EQUIPMENT AGAINST THE ENVIRONMENTAL POLLUTION BY AUTOMOBILES IN KOBE CITY. *(Kobe-shi no jidosha kogai boshi setsubi shikin yushi seido ni tsuite). Text in Japanese. Shisei (City Administration), 20(10):47-49, Oct. 1971.*

Kobe City established a financing system providing funds for private equipment for environmental protection in order to keep the civic environment free of air pollution, noise, and vibration caused by automobiles. This system is applied to double windows, sound proofed walls, sound proofed doors, and air coolers which are installed to control auto exhaust, noise, and vibration of automobiles. It is applied to houses, including private residences, either owned or rented, except those used for business, facing main roads the average traffic volume of which is more than 20,000 cars a day. Persons who request a loan from the financial agencies are required to have completely paid the local tax, have refunding ability, and have one attester. The financing amount is approximately $240 to $600. The interest is 4.2% per year. The refunding term is from 6 to 24 months. The loan is financed through designated banks. If a bank loses the loan of money, the local government guarantees the bank against loss.

19241 APTIC NO. 37521

Shiobara, Yoichi

AIR POLLUTION NEAR YANAGICHO INTERSECTION CAUSED BY AUTO EXHAUSTS AND URBAN REDEVELOPMENT - A VOICE OF A RESIDENT. *(Yanagicho no kotsu kogai to toshi saikaihatsu - Jumin no hatsugen). Text in Japanese. Jurisuto (Jurist), no. 492:92-98, Nov. 10, 1971.*

Atmospheric lead pollution, caused by the large amount of traffic in the Yanagicho area, has caused symptoms of lead poisoning such as nausea, forgetfulness, inertia, and change of character among residents living near the Yanagicho Intersection. Ten countermeasures against lead pollution would be prohibition of the use of lead as a gasoline additive; antipollution devices; prompt compensation of all personal and property demages caused by auto exhaust fumes; the establishment of a green-belt and widened pavements; the transfer of pollution regulative powers to the local governments; an amendment of the pollution regulations in order to put the residents interests before industries profits; enforcement of a no-car day in the Yanagicho area; establishment of special environmental standards of Workmen s Health for the Yanagicho area; construction of underpasses for automobiles; and examination and prompt medical treatment of lead pollution victims. Urban redevelopment projects near Yanagicho intersections have not been adequately studied for commercial use in the Yanagicho area. Residents should participate in urban renewal plans; adequate guidance and explanation is needed by urban renewal authorities.

19242 APTIC NO. 37476

Syrota, J.

THE FIGHT AGAINST AIR POLLUTION IN CEMENT FACTORIES. *(La lutte contre la pollution atmospherique dans les cimenteries). Text in French. Ann. Mines (Paris), no. 11:159-167, Nov. 1971.*

The main cement manufacturing processes and their corresponding sources of pollution are reviewed, and the instruction of Aug. 25, 1971 is presented. This instruction, perfected with the help of the cement industry, aims to reduce emissions to a strict minimum and to disperse them appropriately. Under normal operating conditions, the dust content of gas cannot exceed 150 mg/cu m. Higher concentrations (but under 1 g/cu m) are permitted for only 200 hr/yr. Sulfide compounds are of secondary importance since an important part of the sulfur oxides is removed by the clinker. Compliance with the instruction will lead to investments reaching up to 12% of the cost of a new plant.

19243 APTIC NO. 37452

Takada, Tsutomu

THE BENEFIT SYSTEM FOR VICTIMS OF POLLUTION ESPECIALLY AIR POLLUTION. *(Kogai kanja no kyusai ni tsuite). Text in Japanese. Hoken no Kagaku (Health Care), 13(10):650-654, 1971. 3 refs.*

The Special Measures Law for Pollution shall be applied exclusively to those diseases caused by air pollution and water contamination. Those who have diseases officially attributed to air pollution need the approval of the governor of their area to be eligible for a pollution medical treatment notebook, which entitles them to support for their medical expenses. Half the cost of the various benefits provided by this law shall be borne by industry and the rest by the government and local public organizations.

19244 APTIC NO. 37563

Tarkka, Jukka

AIR POLLUTION CONTROL IN ROTTERDAM AREA. *(Rotterdamin alueen ilmansuojelutyosta). Text in Finnish. Kemian Teollisuus (Helsinki), no. 9:623-626. 1971.*

The Dutch parliament passed a law in 1964 which united 23 local governments of Southern Holland into one loosely connected unit for purposes of co-ordinating air pollution control, port development, and traffic. For air pollution control purposes, 31 strategically placed stations measure sulfur dioxide in the air at hourly intervals. These stations continuously feed their results to a computer, which registers the readings and gives the locations of stations whose readings are too high. Then the industries in these areas are requested to slow down any activities causing the excess pollution. Usually this means decreasing production for a while, checking for and preventing any leaks, and postponing cleaning and other maintenance operations. The public is invited to complain about air and noise pollution by telephone at any time. All complaints are recorded and the locations are marked on a map. Portable measuring units then try to locate the source of the pollution. All pollution problems, except for noise pollution, are international. This is expecially true of the industrial area of Southern Holland, through which flows a water system that has collected wastes from many countries before entering Holland. An international network of agreements to solve these problems is still a thing of the future, so until then voluntary co-operation is the only solution.

19245 APTIC NO. 37237

Wilkins, Paul E.

THE CLEAN AIR ACT: IMPLICATIONS FOR INDUSTRY. *Instr. Control Systems, 45(1):27-28, 30-31, Jan. 1972.*

Under the Clean Air Act, a state must set air quality standards for any pollutant for which the Environmental Protection Agency has issued criteria documents. These standards are to be implemented by control programs that may include restrictions on fuel quality, stack height, and emission control equipment. Also required is adequate legal authority to enforce abatement and control actions. A control officer is generally empowered to inspect a suspected pollution source, and measure the nature and quality of the effluent. Every significant potential source of any of the nine types of air contaminants to be brought under surveillance will be required to maintain a reasonable surveillance over plant operations, and to limit this emission to the atmosphere. In some cases, local pollution control officers may require the installation, operation, and maintenance of on-line monitoring equipment to record performance of processes or control equipment.

19246 APTIC NO. 37396

Wright, Colin

THE CONTROL OF DYNAMIC EXTERNAL DISECONOMIES. *Preprint, Society of Manufacturing Engineers, Dearborn, Mich., 10p., 1970. 3 refs. (Presented at the Economics of Environmental Pollution Abatement, Creative Mfg. Seminar, Detroit, Mich., Dec. 1 2, 1970, Paper MM70-604.)*

The theory of optimal control is applied to the regulation of air pollution. The unregulated air pollution emission rate is viewed as the by-product of a growing industrial process and is therefore assumed to grow over time. The methods of controlling this emission rate in an optimal manner are discussed within the framework of political and economic decision making, demonstrating the differences and establishing that the former will approach the latter in those cases where the politicians exhibit a degree of inconsistency in their procedures. The theories of static externality control and optimal control are mathematically modeled. (Author abstract modified)

19247 APTIC NO. 37364

Yamagata, Soroku

PREVENTION OF AIR POLLUTION VIEWED FROM ADMINISTRATIVE PHASES. *(Gyosei men kara mita taikiosen boshi). Text in Japanese. Hoken no Kagaku (Health Care), 13(10):665-669, 1971.*

The inauguration of the Environmental Agency was decided on July 1971 to prevent environmental hazards and to promote administration of air resources. The administration of the Environment Agency is divided into the following areas: (1) general items for comprehensive coordination; (2) items concerning preservation and maintenance of the natural environment; and (3) items concerning prevention of environmental hazards. The organization, headed by the Director of the Environmental Agency, consists of the Director's Secretariat, Planning and Coordination Bureau, Nature Conservation Bureau, Air Quality Bureau, and Water Quality Bureau. As attached agencies the National Institute of Environmental Hazard and the Training Center of Environmental Hazard are expected to be established by the end of 1973 fiscal year, and by the end of 1972 fiscal year, respectively. Besides these, the Central Council on Measures for Public Nuisance, Natural Parks Council, and Central Birds and Animals Council are placed. As for measures to counter air pollution, the agencies are promoting the strengthening of control objective areas, control objective substances, and methods for control; at the same time, they are promoting the consolidation of a nationwide system for monitoring and estimation. Furthermore, they are encouraging the consolidation of facilities for controlling public nuisance by concerned Ministries, such as areal heating systems, or the building of collected high chimneys.

GENERAL

19248 APTIC NO. 37225

Eschenbach, Dieter

SCIENCE AND TECHNOLOGY 1971, VIEWED IN RETROSPECT. *(Wissenschaft und Technik 1971. Eine Rueckschau). Text in German. Umschau (Frankfurt), 71(26):971-973, Dec. 1971.*

The dominating theme in science and technology in 1971 was environmental pollution. However, the extent of the discussion of this subject was not matched by action. The lead content was reluctantly reduced from 0.5 g tetraethyl lead per liter gasoline to 0.4 g. The industry found this reduction too abrupt and unacceptable. The European literature concerning all other aspects of air pollution provides no advancement. According to a test by the West German Automobile Club, all presently existing (in West Germany) exhaust gas decontaminators are not capable of significantly reducing the emitted toxic gases. In the U. S., such units have been successfully in operation for over two years.

19249 APTIC NO. 37027

Gall, D.

THE WORKING PARTY ON AIR POLLUTION - EUROPEAN FEDERATION OF CHEMICAL ENGINEERING. *International Union of Air Pollution Prevention Associations and National Society for Clean Air, London (England), Intern. Clean Air Congr. Proc., London, England, 1966, p. 267-268. (Oct. 4-7, Paper VIII/3.)*

The organization, composition, aims, and activities of the Working Party on Air Pollution of the European Federation of Chemical Engineering are described. The field of activity lies in problems of air pollution arising from carrying out chemical processes and in the removal of noxious or offensive constituents produced in such processes. The current status of progress in controlling emissions, including grit, dust, sulfur dioxide, nitrogen oxides, and fluorine compounds, is noted.

19250 APTIC NO. 37659

Spurny, Kvetoslav R.

A NOTE ON THE DEVELOPMENT OF THE CHEMISTRY OF AEROSOLS. *Aerosol Sci., 2(4):389-392, Dec. 1971. 18 refs.*

The importance of aerosol physics and chemistry for the solution of the air pollution problem is discussed. Over 2000 research projects on aerosol pollution are being undertaken in the world. New books and journals about aerosols have been published recently. However, there are shortcomings in the literature, and a number of basic questions still need answers. World-wide co-operation and division of labor should play an extremely important part in this endeavor.

19251 APTIC NO. 37291

Zuercher, U.

ENVIRONMENTAL PROTECTION - WHICH ARE ITS TASKS. *(Umweltschutz - welche Aufgaben stellt er). Text in German. Schweiz. Bauztg., 89(50):1249-1255, Dec. 1971.*

Environment and its protection have become slogans unknown several years ago. Of all the aspects of environmental pollution, air pollution has not yet received sufficient attention in Switzerland. This is mainly due to the fact that the waste gases and dust in the air are not directly visible. Concentrated and massive emissions of sulfur dioxide are most dangerous. Air pollution can best be prevented by trying to stop the undesired substances from being discharged. An efficient method for filtering out dust is the creation of green belts and forests.

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